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EFFECTS OF TERRORISM ON TOURISM DEMAND

LOCAL PROJECTIONS APPROACH

Bruno José Ramos Rodrigues

Dissertation presented as partial requirement for obtaining the Master's degree in Statistics and Information Management

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by

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ABSTRACT

This research aims to analyze how the tourism sector reacts to events of terrorism, which have intensified over the last few years all over the world. The objective is to evaluate whether terrorist attacks lead to a tourist behavioral change with regard to decision making on the travel destination; specifically, it is intended to verify if terrorist attacks influence the tourism of the targeted countries and whether tourists choose to travel to competing tourist destinations of the affected country, which, in most cases, presents an image of security and stability. This study is based on the application of the Local Projections approach, which estimated the effects triggered in country's tourism demand for unexpected terrorism actions, during the period between 1995 and 2017 for a sample of 36 countries. Our empirical findings show that terrorist attacks have a severely negative and short-lasting effect on the tourism of the target country. To complement, it was proved that incidents claimed by terrorist organizations guided by Islam have a higher impact on tourism. It was also concluded that tourists opt to substitute the affected destination by their competing countries; in particular, terrorism in a tourist destination contributes to increasing the tourism demand of its competing countries, having a long-lasting effect. Several security, marketing, and economic policies have been proposed and discussed in the paper.

KEYWORDS

Terrorism; Tourism; Tourist Decision Behavior; Competing Tourist Destinations; Local Projections

INDEX

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS AND ACRONYMS

ARIMA	Autoregressive Integrated Moving Average
ETA	Euskadi Ta Askatasuna
G7	Group of Seven
GDP	Gross Domestic Product
GPI	Global Peace Index
GTD	Global Terrorism Database
IRA	Irish Republican Army
IRF	Impulse Response Function
LP	Local Projections
OECD	Organisation for Economic Co-operation and Development
START	Study of Terrorism and Responses to Terrorism
SUR	Seemingly Unrelated Regressions
UNWTO	World Tourism Organization
US	United States of America
VAR	Vector Autoregression
WTO	World Trade Organization
WTTC	World Travel and Tourism Council

1. INTRODUCTION

1.1. BACKGROUND AND PROBLEM IDENTIFICATION

Over the past few years, there has been a significant increase in the number of terrorist attacks around the world that have contributed to creating a climate of fear and insecurity. There does not seem to be a reversal in this trend, as modern societies are increasingly susceptible to terrorism. Since the beginning of the century, and particularly over the last 10 years, high levels of terrorist events have been observed in several developed and stable countries (Goaied, 2019). New York (2001), Madrid (2004), Barcelona (2017), London (2005), Manchester (2017), Utoya (2011), Paris (2015), Brussels (2016), Sousse (2015), Istanbul (2016) are some examples of destinations that have experienced terrorist attacks, but the list goes on in the National Consortium for the Study of Terrorism and Responses to Terrorism.

The harmful effects of these acts affect the growth and development of the countries and regions that are subject to these disasters, with their impacts being felt in various industrial sectors, markets, and economies. The economic consequences resulting from the terrorist attacks depend not only on the nature of the attack, namely the magnitude of the attack but also on a set of specific economic factors, such as economic activity, the sector, the country, and the immediate policies adopted by the government in response to these events.

One of the main economic areas affected by terrorism in recent decades is tourism. Although the probability of an individual suffering a terrorist attack is considerably small, awareness of the terrorist threat is increasingly present in the daily lives of tourists, contributing to a change in the perception of risk in tourist destinations (Cláudia Seabra et al., 2014). The deaths of innocent civilians and tourists, the consequences of these terrorist acts, lead to an increase in the perception of risk, promoting a behavioral change in tourism worldwide. Tourists show a high degree of attention and sensitivity to the possibility of being hit by terrorist incidents, contributing to a significant decrease in the intention of tourists to travel to the affected destinations, resulting in a significant decrease in revenue generated by the tourism sector (Araña & J. León, 2008; Concepciòn et al., 2003). The tourist destination choices are strongly conditioned by terrorism threats (Neumayer & Plümper, 2016; Rittichainuwat & Chakraborty, 2009).

No less important are the indirect impacts. The tourism industry is closely connected to other sectors – transport, trade, and communications technology – that can lead to the closure of companies linked to tourism, the increase in the unemployment rate, the reduction of foreign investment, social exclusion, among others. Therefore, the necessity to measure the time length of each shock is pertinent for policymakers and managers in the tourism industry.

Indeed, terrorism has become one of the biggest global concerns for the tourism industry (Mansfeld & Pizam, 2006). Being aware of the representativeness of the tourism sector in the economy of most countries, radical groups use tourists as a quick and easy way to spread a message that aims to provoke a climate of instability and insecurity, creating frightening societies with fear of traveling to certain destinations. Most of the terrorist attacks that have occurred have been claimed by Al-Qaeda and the Islamic State, two ultra-radical groups whose ideology encourages violence, with tourists being one of its main targets. One of the most recent attacks took place in Paris, on November 13, 2015, where it was estimated that there was a loss of 1 billion euros in the European tourism sector

(Bremner, 2015; Morris, 2015). A second example was the attack on a Tunisian resort on June 26, 2015, which resulted in a drop of approximately two million in the number of tourist arrivals, resulting in an estimated cost of 515 million dollars in revenue (Cadavez, 2016).

It is widely agreed that terrorism events carried out by these specific groups lead to more intense media coverage, managing to disseminate a message of fear and insecurity against the country more quickly. This situation is believed to translate into an immediate change in the tourists' decision to travel to these affected destinations.

Arguably, a structural change in the execution of recent terrorist attacks is evident – they have become more frequent, pronounced, and unpredictable compared to previous phases. These incidents have resulted in a high number of lives lost and people injured, resorting to the use of basic items – for example, the use of passenger vehicles, kitchen knives, and other frequently used items (Corbet et al., 2018).

Despite the recent terrorism incidents that have been plaguing the world, negatively affecting tourism in the targeted countries, the global tourism sector has shown substantial growth year after year. According to the World Tourism Organization, the volume of international tourist arrivals rose from 525 million to 1.4 billion between 1995 and 2018, corresponding to a growth rate of 6 percent in the last year (UNWTO, 2019b). This indicator is expected to reach a record value of 1.8 billion arrivals in the year 2030. Concerning revenues from the tourism sector, this growth trend continues to occur, since 425 billion dollars were generated, in 1995, compared to 1260 billion dollars in 2018. To reinforce the importance of this sector, the WTTC estimates that the contribution, directly and indirectly, of tourism and travel to GDP was 8.8 trillion dollars and 319 million jobs created in 2018, record levels registered, representing 10.4 percent of global GDP (WTTC, 2019).

It could create the illusion that terrorism does not negatively affect tourism demand; however, it is unquestionable that it affects the number of tourists arriving in the affected country and its effects can sometimes spread to neighboring regions, without affecting, however, global tourism. What appears to be happening is that tourists do not stop traveling, they just change their travel plans, replacing the affected destinations with other places where the perception of risk is less. Indeed, it is believed that tourists choose to replace tourist destinations, which have an image associated to insecurity, with alternative destinations or countries that are perceived as safer and offer similar benefits.

Therefore, it has been suggested that terrorism may have positive or negative effects on tourism, with its impact varying from country to country, as some countries suffer more than others. It is relevant to mention that the magnitude of the impact that terrorism has on the tourism industry is commonly determined by the intensity, frequency, duration, and severity of terrorist attacks (Gut & Jarrell, 2007).

The impacts of terrorism on tourism demand have been deeply investigated, however, it is crucial to further analyze this issue to incisively counteract the interruption of the tourist flow in the wake of terrorist events (Almuhrzi et al., 2017; Yap & Saha, 2013; Cohen & Cohen, 2012). More specifically, it is essential to understand the factors that are influencing the spatial patterns of tourism flows and the spillover effects of terrorism (Neumayer, 2004; Prideaux, 2005).

1.2. RESEARCH OBJECTIVES

The present study's main objective is to evaluate and quantify the impact that terrorism has on tourism of countries, analyzing not only the country affected by these disasters but also verifying whether the tourism demand of the competing destinations of the affected country is also influenced by these events. It is intended, therefore, to ascertain whether terrorist acts lead tourists to travel to competitive destinations that normally offer tourist products with similar benefits and to calculate their effect. To this end, the development of Local Projections approach is proposed, analyzing this phenomenon in the period between 1995 and 2017.

Additionally, it is intended to understand and quantify whether the effects caused by terrorism have immediate repercussions on tourism. More precisely, it is intended to evaluate and estimate on average how long it will take to begin to observe the impact that terrorism has on tourism demand in the target countries and their competing countries.

It is also proposed to estimate the duration of the effects on the analyzed countries. In particular, to determine whether the impact of terrorist incidents is persistent over time, or whether, on the contrary, tourism is only affected for a short time.

It is also intended to determine whether the effects on countries' tourism fluctuate based on the terrorist organization that claims it. More precisely, the objective is to differentiate the impact between events committed by groups associated with Islam ideologies – namely by Al-Qaeda and Islamic State – and by groups originated in the affected country motivated by political, social, and cultural issues. This analysis will address the affected countries and the competing countries.

Considering the competing countries, it is also intended to detect disparities across the different regions of the globe, and consequently quantify for each of these regions the impact of terrorism on tourism demand. It will be possible to determine whether competing countries that are located in certain regions of the world benefit more than others in terms of tourism.

To validate and complement the analysis of competing countries, two different approaches are also intended to be estimated regarding the definition of competing countries: in the first one, the competing countries will be defined based on their geographical border; whereas in the second one, they will be based on the tourist product they offer.

Finally, it is also intended to verify whether the impact of terrorism on the tourism of competing countries is influenced by the level of security and stability associated with the country. Therefore, the ultimate goal of this research is to evaluate and calculate the effect that terrorism has on competing countries considered the safest in the world, specifically to perceive if these specific countries obtain greater contributions from tourism.

1.3. RESEARCH RELEVANCE

This study intends to continue the research about the impact caused by terrorism on tourism. Most studies focus exclusively on assessing and quantifying the impact of terrorist incidents as isolated acts that influence only the affected country. In contrast, the present study seeks to contribute to the literature by also analyzing whether terrorism in a country leads tourists to look for traveling to their competing tourist destinations, which offer a tourist product with similar benefits. It is intended to

prove that tourists do not stop traveling; they decide to replace tourist destinations with their competitors.

Another relevant contribution to the literature is the methodology that will be implemented. An econometric approach of Local Projections will be used, which, as it is recent, has never been applied in this area of study. It stands out for being an innovative method that will allow to estimate the effect of shocks, that is, the effect of terrorism on the tourism demand of competing countries, which makes the analysis richer.

The complementary models that will be developed to differentiate the impact of terrorist attacks based on the terrorist group that claims them, also constitute an additional point to the literature, since it is preponderant to realize if the terrorist attacks carried out by the Al-Qaeda and Islamic State have a greater impact on tourism.

Additionally, this study will not be restricted to providing a qualitative classification of the impacts. It will provide a temporal profile of the effects caused by the events of violence, some years after the attack occurred, quantifying them. Indeed, it will be possible to perceive on average how much time is required to visualize the influence of terrorism, as well as the duration of these effects.

The paper is structured as follows. Section 2 contains an overview of the literature on the effects of terrorism on tourism demand, with particular emphasis on the OECD countries' cases. Section 3 describes the data used in this research, including terrorist attacks data, the number of arrivals of international tourists, and a set of control variables for other shocks. Section 4 describes the econometric methodology used to estimate impulse response functions. Section 5 presents the analysis and description of the results concerning the empirical evidence of the existence, extent, and magnitude of links between terrorism and tourism. Section 6 concludes with the summary and main conclusions of the study and presents a set of implications that must be taken into account by governments and competent authorities on tourism.

2. LITERATURE REVIEW

The impact that terrorism has on tourism has been a recurrent research topic in the literature since the early 1990s. Although there is no universal definition, Jongman considers that the definitions of terrorism are as wide and varied as the growing diversity of terrorist acts (Jongman, 2017). According to the Federal Bureau of Investigation, terrorism is the illicit use of force or violence against people or property to intimidate or coerce a government, the civilian population or any segment of it, for political or social purposes. In the GTD, terrorism is conceptualized as "the threatened or actual use of illegal force and violence by a non-state actor to attain a political, economic, religious, or social goal through fear, coercion, or intimidation" (GTD, 2019). Additionally, Martin states that terrorist attacks aim to incite widespread fear among the global population.

The attacks are often developed from the belief that an ultimate power has sanctioned and commanded the terrorist violence. These beliefs are motivated by social, psychological, and religious issues. Collective ideology that appeals to extremist ideas, economic inequalities, authoritarian regimes, and self-sacrifice codes help to explain terrorism. Islamic State and Al-Qaeda are two examples of terrorist groups that have conducted acts of religious terrorism, exercising total authority over the Muslim community worldwide. In contrast, Hamas and Provisional IRA are examples of politically-motivated organizations that advocate the fight for freedom. Extremism is a fundamental component of terrorism, characterized mainly by intolerance, moral absolutes, and conspiratorial beliefs (Martin, 2017).

Terrorist attacks are heavily publicized on global platforms, so they are not random and always have an implicit objective (Marsden & Schmid, 2011). They intend to create a social imbalance, exposing governmental vulnerabilities of the targeted countries. For example, Islamic State and Al-Qaeda have been identified as strongly media-oriented terrorist organizations. They choose symbolic targets, spreading a message of fear and insecurity that influences the general public's perception, which often creates the contagion effect (Gates & Podder, 2015).

Using different attack strategies – kidnapping, bombing or killing – Islamic State and Al-Qaeda intend to perpetuate their fundamentalist ideas and to root their power internationally, to attract potential supporters (Rehman, 2007). Further, these terrorist groups abandoned the stereotyped attack method, preventing security forces from anticipating and reacting to acts of violence. For instance, in Paris, a series of coordinated terrorist attacks; in Brussels, a coordinated suicide bombing; and, in Nice, the devastating truck-attack that was deliberately driven into a crowd (Corbet et al., 2018).

Simultaneously, international tourism has a significant impact on the development and economic growth of a country. Several studies have been published that demonstrate the existence of a positive linear relationship between tourism and economic growth (Dritsakis, 2012; Eeckels et al., 2012; Hatemi-J & Gunduz, 2005). However, the fact that a country is being affected by a terrorist incident can contribute to the opposite situation (Baker, 2014).

Tourism demand is particularly sensitive to terrorist attacks since tourists' choices value safety, tranquility, and peace (Araña & León, 2008). Past research has unequivocally demonstrated the strong influence that terrorism exerts on tourism demand, and showed that tourism is one of the economic sectors that is most exposed to this threat. Enders and Sandler reported that the occurrence of a terrorist attack, not only contributes to a substantial loss in revenue generated by

the tourism sector, but also contributes to a momentary decrease in foreign direct investment (Enders & Sandler, 1996). Fletcher and Morakabati argued that this situation is due to the decrease in confidence in doing business transactions with countries affected by these catastrophes, which leads to a reduction in the capital required to guarantee continuous economic growth (Fletcher & Morakabati, 2008). To support this statement, Bernini and Guizzardi revealed that the increase in regional and global terrorism caused significant disturbances in the economic and legal environment, increasing corporate regulations and economic obstacles (Bernini & Guizzardi, 2010).

Indeed, the repercussions of the effects caused by these barbaric and unexpected acts have led to a growing investigation in this area in recent years. Estrada and Koutronas argue that severe shocks, concentrated over time, can cause major disruptions in specific sectors of the economy. Therefore, the importance of realizing whether terrorism leads to transient or persistent shocks is highlighted, and consequently, determining the policies that must be implemented to mitigate the negative effects quickly (Estrada & Koutronas, 2016). Terrorism has become a primary factor to be considered by the tourism industry, as these incidents affect tourism activity more intensely when compared to other types of shocks, namely natural disasters, financial crises or health crises (Sönmez, 1998).

Barros et al. highlight that a shock has a temporary or short-term effect if, after a certain period, the time series returns to its original performance level. In other words, the effect of the shock triggered by a terrorist incident on the number of international tourist arrivals is easing rapidly. In contrast, there is a persistent or long-term effect, when the temporary effect of shocks diverges to a trend in tourism demand different from that, which existed in the year in which the attack occurred (Barros et al., 2016).

Several studies have examined the relationship between tourism and terrorism for various countries, using panel data, and it has been concluded that terrorist attacks have a significant negative effect on the number of international tourist arrivals and on revenue generated by the tourism sector (Arunatilake et al., 2001; Buigut & Amendah, 2015; Drakos & Kutan, 2003; Fleischer & Buccola, 2002; Yap & Saha, 2013). Several approaches have been applied to analyze the effects of terrorism on tourism.

A study developed by Llorca-Vivero evaluated the difference in routine tourist flows and international arrivals, for the period between 2000 and 2007, after the occurrence of a terrorist act in countries belonging to the G7, applying for this purpose a cross-sectional model of increased gravity (Llorca-Vivero, 2008). It concluded that terrorism has a significant influence on tourist flows, and that effect is observed most intensely in developing countries. Additionally, Feridun applied an autoregressive distributed lag bounds testing procedure and verified the existence of a negative causal effect of terrorism on tourism demand (Feridun, 2011).

Raza and Jawaid investigated the impact of terrorist incidents that occurred in Pakistan and Turkey between the period of 1980 and 2010, and the effect on the tourism sector of these countries. Applying a Johansen and Jeuselius co-integration testing approach, they demonstrated that the terrorist attacks had a significant negative impact on tourism in the short term, which has faded over the years, although it has persisted for approximately seven years. However, a small number of observations have been analyzed that could not be sufficient for the long-run analysis (Raza & Jawaid, 2013).

Additionally, Liu and Pratt measured the relationship between terrorism and tourism, using an econometric forecasting model – ARIMA – and a panel data for 95 countries. They revealed that not only does terrorism restrict tourism in the affected country, but it also ends up discouraging tourism in neighboring regions (Liu & Pratt, 2017).

According to Zillman, although the influence of terrorism on the tourism demand of a destination is high, it does not have a long-lasting effect. Through the application of an econometric methodology, the researcher proved that it takes 13 months for tourism to recover from a terrorist attack, while it takes 21 months to recover from a disease, 24 months to recover from an environmental disaster, and 27 months to recover from political unrest. It reveals that tourism is more resilient to terrorism, however, during this period the magnitude of terrorism effects' is very intense (Zillman, 2015).

The duration of the effects has been addressed in only a few studies. The results are ambiguous and depend on several factors: the destination, the analyzed period, the frequency, and the severity of the terrorist attacks.

In Enders and Sandler research, a time lag between terrorist events and a decline in tourism during was predicted during 3–21 months. Pizam and Smith demonstrated that the tourist flow reduction is observable during 1–3 months and, on average, after 6 months the terrorism impact fades. In contrast, Sloboda' research revealed that one year after the terrorist attack significant decreases are observed. Additionally, Neumayer found that both the contemporaneous and long-term effects are robust (Enders et al., 1992; Enders & Sandler, 1991; Neumayer, 2004; Pizam & Smith, 2000; Sloboda, 2003).

Therefore, it appears that the tourism industry is vulnerable to the indiscriminate terrorist attacks that have been felt. Goldman and Neubauer-Shani observed a significant inverse relationship between the number of arrivals and the terrorist attacks, insofar as they concluded that the greater the number of international tourist arrivals to a specific country, the greater the likelihood that this country be the target of a terrorist act (Goldman & Neubauer-Shani, 2016). Invariably, this situation negatively affects the image of destinations and causes a decline in tourist arrivals (Mansfeld & Pizam, 2006).

Recent terrorist incidents are predominantly regional, as they depict isolated incidents that affect only the region where the attack occurred, but not the tourism sector globally (Lagrave, 2016). Additionally, it is also important to note that frequent and accentuated terrorist attacks have a more deteriorating impact on a country's tourism demand, than in regions where there is a lower number of incidents. It is concluded that the longer the duration of a security crisis and the more intense they are, the greater the impact verified on local tourism (Mansfeld & Pizam, 2006).

As a consequence of these events, tourists change their decision-making regarding the tourist destination. Instead of choosing higher-risk destinations, they opt to substitute them with destinations that offer greater security and stability (Mckercher & Hui, 2004; Rittichainuwat & Chakraborty, 2009; Sönmez, 1998).

Safety and security of destinations are considered influential on international tourism demand (Chan et al., 2005). According to previous studies, tourists' safety and security is an absolute prerequisite.

Insecurity in a tourist destination can lead tourists to develop a negative perception of the country, causing a significant decline in the prospective tourists' flow (Fowler et al., 2012).

The bombing of Bali in 2002 and 2005 and Thailand's riots are examples that demonstrate a decrease in international tourists in the subsequent period (Ghaderi et al., 2012). The researchers pointed out that travelers' risk perceptions about their personal safety have a major impact on tourism demand. Consequently, unsafe destinations will have constraints in attracting tourists. Therefore, as tourists' decisions are based on their perceptions, destinations must address any safety concerns (Fletcher & Morakabati, 2008; Fowler et al., 2012; Mansfeld & Pizam, 2006).

Security is a basic human need. Tourists seek to travel to destinations that offer them comfort and tranquility without feeling threatened. As such, the possibility of a terrorist attack occurring can lead to a change in tourists' risk perception, preventing them from traveling to these destinations – which will harm tourism demand (Cláudia Seabra et al., 2014). This proves that safety affects human behavior in general and consumer behavior in particular (Isaac & Velden, 2018).

According to the Institute for Peace Economics, in 2015, the contribution of the tourism sector to the gross domestic product in countries that had no terrorist activity was twice as large when compared to affected countries. The same rationale is observed between 2008 and 2014. The average contribution of tourism to gross domestic product growth was 3.6 percent in countries not affected by terrorist attacks and 1.9 percent in targeted countries (Institute for Economics & Peace, 2016).

However, Wolff and Larsen revealed a situation in which the previously stated did not occur. After the massacres in Olso, Norway, on November 22, 2011, the perceived risk among tourists remained unchanged, as the decline in the number of arrivals in this country in the following years was insignificant. It is proposed that it is because Norway is considered a relatively safe destination, with almost no history of terrorist attacks; in fact, it was proved that this terrorist incident was an isolated situation and did not intensely influence tourists' perceived risk. The event was seen as rare and unlikely. Therefore, it can be extrapolated that this specific terrorist attack has a neutral effect on the tourist statistics of the country, for being sporadic and without the purpose of causing large damage to human and material capital (Wolff & Larsen, 2014, 2017).

The probability of tourists estimating the occurrence of a terrorist attack is given by their risk perceptions that result from the weighting of several extrinsic factors, namely physical, health, financial, criminal, and terrorism. Risk perceptions can therefore damage the tourism industry and inhibit travel (Roehl & Fesenmaier, 1992; Sönmez, 1998; Um & Crompton, 1992).

Security directly influences the evolution and growth of tourism. Specifically, security acts as a driving force, while perceived risk acts as a repressing factor for the tourist destination choice. Generically, a high-risk perception encourages the substitution of travel plans (Choi & Sirakaya-Turk, 2005).

Risk perception reveals to be a determinant factor that harshly influences tourists' decision-making. Previous studies report that war, terrorist attacks, and political conflicts are points of instability that concern society transversely. It is noteworthy that even the younger generations are repressed in visiting tourist destinations that have experienced terrorism activity, avoiding uncontrollable and random risks of potential damage (Coca-Stefaniak & Morrison, 2018; Kapuściński & Richards, 2016).

The mass media strongly influence tourists' risk perception concerning the affected destinations, given the fact that terrorist attacks are heavily mediated at a global level. Tourists are immediately informed of the disastrous consequences caused by these incidents through often sensational reports, whose primary objective is to gain as much audience as possible, being able to manipulate the potential tourists' vision and opinion. The change in the security perception resulting from a subjective interpretation can lead tourists to react and decide, rationally and emotionally, to replace the country. Therefore, news coverage is referred to be an additional constraint to thriving tourism industry, which leads groups like Islamic State and Al-Qaeda to execute terrorism events, since they will be able to cause fear and panic to a greater number of individuals (Cousins & Brunt, 2002; Namberger et al., 2019).

Media coverage of terrorism or political upheaval has the potential to create individuals' distorted images of destinations. The association of terrorism upon media exploration is illustrated by Ted Koppel's comparison: *without television, terrorism becomes rather like the philosopher's hypothetical tree falling in the forest: no one hears it fall and therefore it has no reason for being* (Farnen, 1990).

Additionally, the memory effect plays a crucial role in altering tourists' decision-making. The memory effect is defined as any feeling, emotion or apprehension that leads individuals to change their habitual behavior, in response to devastating events experienced or visualized that implicitly alter individuals' perception.

Terrorist attacks cause a change in the positive image of the tourist destination initially formulated by the tourist. The memory effect leads tourists to associate affected destinations with unsafe places, where there is a possibility of new attacks. Consequently, tourists choose to replace countries associated with negative memories with places they consider safer (Lutz & Lutz, 2020). According to previous research, although the effects may last for quite a long time, they are usually not permanent, resulting in tourists returning to their original destinations (Baggio & Sainaghi, 2011).

It should also be noted that, in addition to the effects that terrorist attacks have on the tourist sector of the target country, there are spillover effects. Bassil, through the application of a SUR model, demonstrates that the terrorist attacks that occurred in Israel contributed to a significant decrease in tourism demand from neighboring countries, namely Lebanon and Turkey. They concluded, therefore, that the tourism sector, in addition to being susceptible to terrorist attacks occurring in the country itself, also affects neighboring countries. This is due to the spatial spillover effects that will affect destinations and entire regions (Bassil, 2014; Nikšić Radić et al., 2018).

From an economic perspective, the spillover effect refers to the influences that an economic activity can have on any element due to an independent event occurring from a seemingly unrelated event. The spillover effect can cause either negative or positive outcomes.

In tourism, spillover effects are closely related to a spatial perspective. It denotes the unexpected effects that the tourism sector of a certain country has on tourism demand of other countries. When a region benefits or is harmed by its neighbors' tourism flows, positive spillover effects or negative spillover effects occur, respectively (Yang & Wong, 2012).

Drakos and Kutan when assessing and quantifying the effects that terrorism caused on the arrivals of international tourists to Greece, Israel and Turkey, found that in addition to the harmful effect on the

tourism sector of these countries, there was also an improvement in tourism in Italy, a safe country of reference (Drakos & Kutan, 2003).

It is concluded, therefore, that terrorism can have a positive or negative spillover effect on tourism demand in other countries. This statement is corroborated by Frey, Luechinger and Stutzer who showed that terrorist attacks lead tourists to replace an unsafe tourist destination with another, which has a security image associated. They also demonstrated that 89 percent of losses in revenue from the affected country's tourism sector flow to the economy from the safest destinations. Therefore, it is verified that tourists show a high preference for more stable and peaceful geographic areas. They choose alternative destinations with similar characteristics but with a more stable environment (Frey et al., 2009; Neumayer, 2004).

The substitution effect in tourism is characterized by the change of destination choice initially foreseen by another, as a result of the variation of several extrinsic factors, namely fluctuations in price, in the elasticity of demand and in the risk perception or the desire to try new products or experiences (Prideaux, 2005).

Enders and Sandler implemented the Unrestricted Vector Autoregressive model, analyzing the period between 1970 and 1988, when there was an intensification of terrorist activity by the Basque separatist group ETA, in Spain. The existence of a negative cause-effect relationship between tourism demand and terrorism was concluded. Additionally, there was a clear substitution of affected tourist destinations by others located in different regions (Enders et al., 1992).

The substitution effect was also investigated by Martin and Gu who analyzed passenger flows at Orlando airport between 1971 and 1984. They concluded that the terrorist activity's growth in Europe and the Middle-East region impacted the number of arrivals at that airport (Martin & Gu, 1992).

After the 9/11 events, it was found that US citizens chose to travel preferentially to Hawaii instead of looking for international destinations, minimizing the losses resulting from the drop in the number of international tourists expected in US (Bonham et al., 2006).

The findings of previous studies converge on the idea that tourists, faced with the occurrence of a terrorism event, do not stop traveling; however, they tend to change their travel plans, opting for tourist destinations whose perception of risk is lower.

Yaya found that terrorist activity in Turkey negatively influenced local tourism demand; in opposition, it was concluded that the Madrid bombings in 2004 contributed to a significant increase in the arrival of international tourists to Turkey. This situation is due to the fact that these countries are considered as close substitutes by tourists. Some studies have shown that terrorist attacks have contributed to the growth of tourist flow from neighboring countries that had a low or moderate risk perception – although the tourist sector in the affected country shows declines. One example is Dubai, which is a safe regional alternative to countries heavily marked by military conflicts, namely Lebanon and Syria (Yap & Saha, 2013; Yaya, 2009).

The trend of alteration in the decision-making process of German tourists regarding the tourist destination was investigated, analyzing several terrorism events located in the Middle East – Egypt (1997), Tunisia (2002) and Morocco (2003) – in the Southwest Asian – Indonesia (2003) – and in the

United States of America – 9/11 (2001). The results showed an increase in the risk perception concerning these destinations, which led German tourists to replace them in favor of Southern European countries which had a similar tourist product and greater safety (Ahlfeldt et al., 2015).

These conclusions were corroborated by Araña and León who implemented an approach to understand and assess how tourists choose alternative destinations in the Mediterranean area when a terrorist attack occurs. It was concluded that countries such as Tunisia and Turkey, where the Islamic population predominates, are neglected compared to the Canary and Balearic Islands, where this proportion is lower (Araña & J. León, 2008).

Spatial spillover effects in international tourism due to terrorist attacks was analyzed in Neumayer & Plümper. Authors used a spatial dyadic approach and concluded that terrorist attacks on tourist destinations reduce the tourist's demand of the targeted tourist destination which has been attacked. They also discovered that spatial spillover effects set in, they reduce tourism flows from other similar source countries to the same destination country. In addition, tourism flows from the same source country occurs to similar destination countries (Neumayer & Plümper, 2016).

Finally, Korstanje and Clayton conclude that it is unlikely that terrorism will disappear, stating that in fact it is almost certain that it will evolve into more advanced forms, with the help of more sophisticated technologies. However, as can be seen from the literature, although numerous studies have been developed to determine the impact that terrorist attacks have on tourism demand, it is still limited in understanding the decisions of tourists, when faced with an unexpected act of violence (Korstanje & Clayton, 2012). As it turned out, tourists continue to travel, changing only their travel plans. Thus, it becomes preponderant to verify if tourists replace the affected countries with competing destinations, using a different econometric approach, Local Projections.

3. DATA

This dissertation intends to study the causal relationship between terrorism and the tourism demand of countries. Therefore, it has collected data on the terrorist incidents that have occurred in recent years and data on the tourist industry.

This research employs an annual time series data from 1995 to 2017, a total of 23 years. This extended time is a requirement of the econometric methodology applied to ensure that true and accurate forecasts are obtained that convey a real image of the terrorism impact. Additionally, it encompasses a period where significant variations in tourism demand and terrorist incidents have been recorded.

A sample of 36 countries was considered. 35 OECD countries were selected since these destinations are contained on the list of the top destinations of the UNWTO concerning the number of foreign visitors (UNWTO, 2019a) and register high levels of terrorist activity. Tunisia was also considered for being an active competitor of several OECD countries included in the research and its history of tourist activity is severely influenced by the occurrence of terrorist attacks.

3.1. TOURISM DEMAND

The tourism demand is the dependent variable, which is measured by the number of international tourist arrivals in the countries. The data was extracted from The World Bank (World Bank, 2019) for the period 1995 to 2017.

According to Song and Li, this indicator is the most representative and determinant of a country's tourist activity, being commonly used in tourism research (Song & Li, 2008). Alternative measures for the volume of international tourism could be used – particularly, the receipts generated by tourists to verify the influence of terrorism in the financial field (Nikši, 2018). However, due to data availability and multicollinearity problems, which emerge when tourism receipts are combined with GDP, the standard approach of using the number of international tourist arrivals was followed.

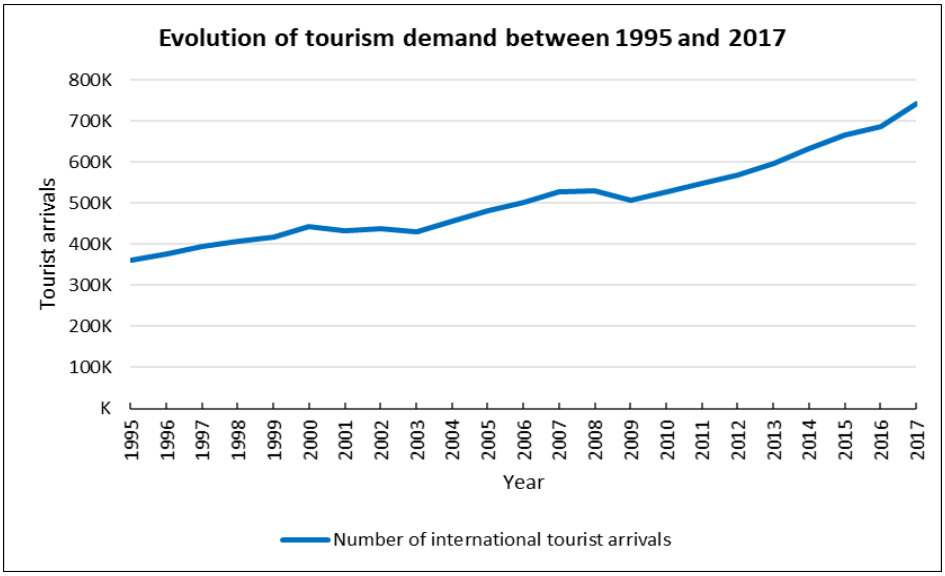

Figure 3.1 – Evolution of tourism demand between 1995 and 2017

Figure 3.1 depicts the evolution of the number of international tourists' arrivals for the 36 countries. It is clear from the time-profile that there is a clear positive trend in the tourism demand – a generalized increase of travelers over the past years is observed. Particularly, from 1995 to 2017, a growth of about 51.3 percent in the tourist activity of the countries is quantified – the number of tourist arrivals more than doubles in this period.

The economic and social development that has arisen over the last 20 years is referred to as determinant factors for the growth of the tourism sector. The first period of intense growth in tourism demand is observed between 1995 and 2000; it is quantified with an increase of approximately 18.5 percent.

However, it should be emphasized that the rapid and intense evolution of tourism is not observed in all the years. For instance, in 2001, a loss of around 2.4 percentage points in tourist arrivals was identified when compared to the previous year. It is argued that this downward movement was due to the September 11 terrorist attacks in the US that set a climate of fear and insecurity throughout the world, inhibiting tourists from traveling (Paraskevas & Arendell, 2007).

From 2004 onwards, there has been a recovery in the tourism industry, but it is interrupted four years later. In 2009, there is suddenly a decrease in the number of international tourist arrivals of approximately 4 percentage points compared to the previous year. The literature states that it was a year particularly affected by different shocks – terror incidents, political and financial crises – that were decisive factors to contribute to a decrease in global tourism demand (Teulings & Zubanov, 2014; Yap & Saha, 2013).

The countries were able to mitigate the harmful effects and there has been a substantial recovery in the tourism sector in subsequent years. For instance, in 2017, a significant growth in tourism demand of around 7.5 percent is observed compared to the previous year. This demonstrates the severe and positive trend in the tourism sector – being a relevant study topic. The forecasts point to its continuation, and even to an exponential increase in the volume of international tourists, due to the increasing ease of travel (Nguyen et al., 2018).

Countries	**Total of Tourist Arrivals (Thousands)**
France	1 761 254
United States Of America	1 295 457
Spain	1 241 628
Italy	968 294
United Kingdom	636 251
Germany	549 640
Mexico	539 030
Turkey	515 248
Austria	486 818

Table 3.1 – Top 10 countries in volume of tourist arrivals between 1995 and 2017

It is relevant to analyze the volume of international tourists of the study. Table 3.1 presents the number of visitors for each country for the period between 1995 and 2017, indicating the ten countries with the highest volume for the variable.

France and the United States are the countries with the highest tourism demand. These are followed by three other European countries, namely Spain, Italy, and the United Kingdom. These countries are more likely to experience structural changes in tourist activity after the occurrence of a terrorist attack.

3.2. GLOBAL TERRORISM

The variable representing the indicator of terrorism for countries has been extracted from the *Global Terrorism Database* (GTD, 2019), which is a database comprising qualitative and quantitative data to describe each terrorist attack that occurred between 1970 and 2018.

It has been published by the National Consortium for the Study of Terrorism and Responses to Terrorism. It consists of an exhaustive database covering different types of terrorist attacks: attempted, isolated and effective attacks. For a terrorist incident to be included in the GTD it must at least satisfy two of the following criteria established by START:

- Criterion 1: *The act must be aimed at attaining a political, economic, religious, or social goal. In terms of economic goals, the exclusive pursuit of profit does not satisfy this criterion. It must involve the pursuit of more profound, systemic economic change.*

- Criterion 2: *There must be evidence of an intention to coerce, intimidate, or convey some other message to a larger audience (or audiences) than the immediate victims. It is the action taken as a totality that is considered, irrespective if every individual involved in carrying out the act was aware of this intention. As long as any of the planners or decision-makers behind the attack intended to coerce, intimidate or publicize, the intentionality criterion is met.*

- Criterion 3: *The action must be outside the context of legitimate warfare activities. That is, the act must be outside the parameters permitted by international humanitarian law (particularly the prohibition against deliberately targeting civilians or non-combatants).*

To summarize, the GTD index provides a detailed description of the terrorist activity of a country – reveals the number of terrorist incidents in a given year, the number of fatalities and injuries caused by terrorism in a given year, the weapons and the nature of the target, the approximate level of total property damage from terrorist incidents in a given year and the group or individual responsible for the attack.

In this dissertation, the effective terrorist incidents presented on the GTD list were considered.

The following table presents the sample of countries selected, along with the frequency of terrorist incidents documented for each tourist destination.

Country	Number of Terrorist Attacks
Australia	5
Austria	3
Belgium	5
Canada	4
Chile	2
Czech Republic	2
Denmark	2
Estonia	2
Finland	1
France	9
Germany	5
Greece	2
Hungary	2
Iceland	0
Ireland	0
Israel	7
Italy	2
Japan	1
Korea Republic	0
Latvia	1
Luxembourg	0
Mexico	3
Netherlands	2
New Zealand	0
Norway	1
Poland	1
Portugal	0
Slovakia	0
Slovenia	0
Spain	5
Sweden	2
Switzerland	0
Tunisia	2
Turkey	6
United Kingdom	7
United States of America	6

Table 3.2 - Frequency of terrorist attacks per country

Figure 3.2 presents a graph depicting the frequency of terrorist attacks that occur in the observance period. Between 1995 and 2000 there was a substantial decrease in terrorist activity, particularly a drop of approximately 4 percentage points. However, there are some reversals in this downward trend in 1999.

It is relevant to emphasize that this situation does not invalidate that the intensity and the effects provoked may have greater repercussions than periods with a higher frequency of attacks (Feridun, 2011). An example of this is the terrorist attack of September 11, which, as mentioned above, was able to influence the global tourism sector.

Since 2005, there has been an overall significant increase in the number of terrorist attacks. It is also preponderant to underline that the OECD countries with lower levels of terrorist activity were New Zealand and Denmark. In contrast, countries with higher frequencies of terrorist attacks were France, the United States of America and Turkey. Intriguingly, these countries are presented in the list of countries with the largest volume of international tourists, as exposed in Table 3.1.

Therefore, the validity of the variable terrorism for the present research is demonstrated by large variations, which have been verified over time.

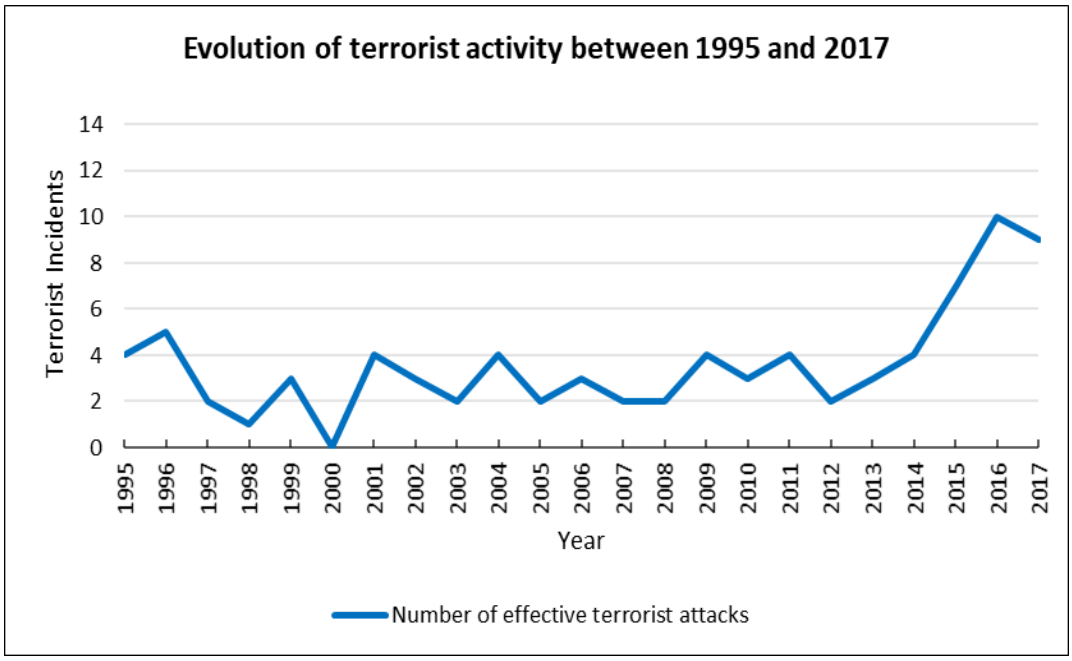

Figure 3.2 – Evolution of the number of terrorist attacks between 1995 and 2017

Annex 10.2 presents terrorist attacks sorted by country between 1995 and 2017.

Another objective of this article is to evaluate and quantify the impact that terrorism has on tourism demand of competing countries.

A destination is a combination of products, services and experiences designed to attract and satisfy potential tourists. Therefore, consumers will be able to select and evaluate a destination amongst alternatives, which leads to tourist destinations competing with each other (Heath & Wall, 1992).

In recent decades, the conceptualization of the factors and dimensions that influence the competitiveness of tourist destinations has created controversy. Crouch and Ritchie have developed the most complete and generally accepted research of tourism competitiveness.

Crouch and Ritchie proposed a modification of Porter's Competitiveness Framework, which encompasses the macroenvironmental and microenvironmental forces that influence the choice of destination by tourists. The factors are represented in the model grouped into five dimensions

First, the core resources and attractions refer to the tourist product that is offered, namely physical geography, history, special events or tourism superstructure. Second, the supporting factors and resources denote the foundation supporting the development of the tourism industry such as infrastructure, accessibility and services. Third, destination policy, planning and development are

relevant to guiding the directions, form and structure of tourism development. Fourth, destination management focuses on those activities that enhance the appeal of the core resources and attractions, strengthen the quality and effectiveness of the supporting factors and resources and best adapt to the constraints imposed by the qualifying determinants. Lastly, the qualifying and amplifying determinants include some external variables, such as location, production costs and public safety, whose effect cannot be predicted (Ritchie & Crouch, 2000).

The weighting of these dimensions permits us to truly perceive which factors contribute to the competitiveness between countries. This generally accepted model served as a basis for the definition of the competing countries presented in this study. This method of countries competitiveness definition is widely used in the literature, so the same methodology was followed in this dissertation (Calderwood & Soshkin, 2019; Červová, 2017; Michniak, 2012; Omerzel, 2003; Schwarz et al., 2019; Tourism Industry Association of Canada, 2008; World Economic Forum, 2019; Feldmane, 2015; Conect, 2019; Buigut et al., 2021; Claudia Seabra et al., 2020; Fernández et al., 2020; Ghaderi et al., 2012; Marques et al., 2021; Parra-López & Oreja-Rodríguez, 2014)

Country	Competing Countries
Australia	Japan, United States of America, New Zealand
Austria	France, United Kingdom, Germany, Switzerland
Belgium	Luxembourg, France, Netherlands, Luxembourg
Canada	United States of America
Czech Republic	Austria, Germany, Hungary
Denmark	Sweden, Denmark, Finland
Estonia	Latvia
Finland	Sweden, Norway, Denmark
France	Austria, Germany, United Kingdom, Italy
Germany	France, United Kingdom
Greece	Spain, Portugal, Turkey, Israel
Hungary	Poland
Iceland	Netherlands, Norway, Sweden
Ireland	United Kingdom, France, Denmark, Switzerland
Israel	Turkey, Greece
Italy	United Kingdom, Turkey, France
Japan	United States of America, Australia, Korea Republic, New Zealand
Korea Republic	Japan
Latvia	Estonia
Luxembourg	Belgium
Mexico	United States of America, Canada
Netherlands	Belgium, Germany
New Zealand	Australia, United States of America
Norway	Finland, Denmark
Poland	Hungary, Slovakia

Portugal	Spain, Greece, Tunisia
Slovakia	Poland, Czech Republic
Slovenia	Italy, Austria, Switzerland
Spain	Portugal, Greece, Turkey
Sweden	Norway, Denmark, Finland
Switzerland	Austria, Ireland
Tunisia	Portugal, Spain, Greece
Turkey	Israel, Greece, Spain, Italy
United Kingdom	France, Germany, Italy, Ireland
United States of America	Canada, Japan

Table 3.3 – List of competing countries

3.3. GLOBAL PEACE INDEX

The classification of countries based on the associated security level was obtained using the Global Peace Index (GPI). This indicator is the world's leading measure of global peacefulness released annually by the Institute for Economics & Peace since May 2009.

The GPI covers 99.7 percent of the world's population – corresponds to a set of 172 countries – and uses 23 qualitative and quantitative indicators from highly respected sources to compile the index, in particular data collected and collated by the Economist Intelligence Unit.

These indicators are grouped into three key domains: *ongoing conflict*, *safety and security*, and *militarization*. This means that the Global Peace Index includes the terrorism impact indicator, which allows for reflecting the stability and security that is felt in each country and thus obtaining the image of the safest countries in the world. Therefore, ranks were obtained for each country in the period between 2008 and 2017 (Annex 10.1).

3.4. CONTROL VARIABLES

Six control variables related to the economic sector were selected – GDP per capita, inflation rate, tourism and travel contribution to GDP, tourism and travel contribution to employment, capital investment in tourism and travel, government spending on tourism and travel, and population.

Control variables are a requirement of the applied methodology, used to isolate the effects around the tourism variable and ensure that only its individual and unique effect is being interpreted, controlling all other possible factors that can influence it – guaranteeing the correct interpretation of the results, reducing the endogeneity problem. They capture macroeconomic problems and other structural shocks on tourism demand.

Data is also collected from The World Bank (World Bank, 2019) for the period between 1995 to 2017.

The Gross Domestic Product per capita is calculated based on the monetary worth of a nation's goods and services in each year, being considered as a proxy of the income level. Therefore, GDP is a

primordial factor influencing tourist arrivals to destinations, being positively correlated. (Li et al., 2006; Rudez, 2008)

Tourism and travel contribution to GDP corresponds to the piece of GDP – revenue – generated by all industries directly related to the tourism and travel sector. Tourism and travel contribution to employment reflects the total percentage of employees working in tourism and travel-related economic activities. Hence, these two indicators reflect the importance that the tourism industry represents in each country. Tourism constitutes the main driver of economic leverage in some countries.

Capital investment in tourism and travel is calculated as an indicator of government investment to evolve the tourism and travel sector successfully. Furthermore, government expenditure on tourism and travel is used as a measure of the expenditure that the country's government has to invest to guarantee the efficient functioning of the tourism and travel sector. These variables have been used in empirical studies about tourism, it is defended that the government's investment in the country's tourism is positively associated with an increase in the number of international tourists' arrivals. (Kulendran & King, 1997; Song et al., 2003)

Inflation rate – which reflects the percentage increase in prices over a given period – is also considered a significant explanatory variable in inbound tourism (Wang et al., 2009).

Population should be considered as a control variable. A significant growth in the world population over years has been estimated and projections indicate that this trend will continue. It is argued that there is a positive causal relationship between the growth of the world population and tourism demand – it is also expected that more individuals mean more travelers.

Table 3.4 presents a summary of the descriptive statistics of the research variables.

Variable	Units of Measure	Observations	Mean	Minimum	Maximum	Standard Deviation
Tourist Arrivals	Thousands	828	8,82	5,25	11,37	1,28
Yearly Number of Terrorist Attacks (Affected Country)		828	0,1	0	2	0,30
Yearly Number of Terrorist Attacks (Competing Countries)		828	0,68	0	4	1,12
Tourism Contribution To GDP	U.S. Dollars (Billions)	828	1,84	-34,95	160,17	10,15
Tourism Contribution To Employment	percent Growth Rate	828	2,21	-2,18	6,23	1,63
Government Spending On Tourism	U.S. Dollars (Billions)	828	0,82	0,00	18,31	2,38
Capital Investment In Tourism	U.S. Dollars (Billions)	828	1,07	-3,51	5,26	1,51

GDP per capita	U.S. Dollars/Capita	828	10,03	7,68	11,69	0,85
Inflation Rate	Price Index	828	3,81	-4,48	89,11	7,72
Population	Thousands	828	9,64	5,59	16,71	1,92

Notes: Tourist Arrivals, Tourism Contribution to Employment, Capital Investment in Tourism, GDP per capita and Population are presented as a natural logarithm

Table 3.4 – Summary statistics of the variables under analysis

It is also intended to differentiate the way terrorist activity impacts tourism demand of competing countries by regions in the world. The geography distribution of the destinations by region is presented in Table 3.5.

The sampled destinations cover almost all the regions in the world. Sixteen of the thirty-six countries are located in the North of Europe, followed by the South of Europe represented by nine countries. Additionally, East Asia & Oceania, and America are composed of a sample of four countries each. Finally, three tourist destinations in Middle East & North Africa, which constitute a region characterized by developing countries, were observed. Therefore, these three regions account for a total of 30,5 percent of the countries under analysis.

Region	Frequency	Percentage (%)
East Asia & Oceania	4	11,1
North of Europe	16	44,4
South of Europe	9	25,0
America	4	11,1
Middle East & North Africa	3	8,3
Total	36	100

Table 3.5 – Geographic distribution of countries

4. METHODOLOGY

The Local Projections approach developed by Òscar Jordà is employed to estimate several impulse response functions. These functions capture the dynamic response of the tourism industry in the face of a terrorist attack – the shock – analyzing not only the affected countries but also their main competing destinations. Therefore, it is possible to detect and estimate the changes/oscillations in tourism demand of a country as a response to the shock – in this case, the terrorist incident (Jordá, 2005).

This econometric method has introduced a new methodology to estimate impulse functions, applying non-parametric techniques. It is based on estimating separate ordinary least squares – standard regression models – to each forecast horizon. As such, one advantage of this method is allowing robust estimation of misspecification models, as it does not require the specification and estimation of the unknown true multivariate dynamic system itself.

According to Jordà, as Local Projections are a collection of IRFs for each horizon, it provides better results when compared to traditional methodologies namely Vector Autoregression. It is argued that the VAR is ideally designed to forecast predictions for one-period ahead, so misspecification errors in the estimation can generate inaccurate and inconsistent impulse responses for the subsequent periods (Jordà, 2005).

This approach allows the presence of asymmetries and nonlinearities in the dataset, being able to capture oscillations as a response to impulses. It enables the construction of an accurate time-profile of the IRF for the shock variable. However, it is important to ensure a reasonable number of observations and shock events, as Local Projections are biased when a small sample is studied. The greater the number of observed horizons, the greater the bias can be retained in the analysis (Herbst & Johannsen, 2021).

Auerbach and Gorodnichenko use Local Projections to estimate state-dependent fiscal multipliers (Auerbach & Gorodnichenko, 2017). Another example of application of Local Projections is with Hamilton, who used this procedure to trace out the dynamics of an oil shock and to assess non-linearities (Hamilton, 2011). The LP estimator was also applied to assess the response of real and financial variables to a monetary policy shock (Cesa-bianchi et al., 2016; Miranda-agrippino et al., 2017). Furceri and Zdzienicka, and Teulings and Zubanov implemented this econometric approach in another area of study, specifically developing a model to identify the effect caused by the global financial crises on the countries' economies (Furceri & Zdzienicka, 2012; Teulings & Zubanov, 2014).

Theoretically, considering $y_{i,t}$, $X_{i,t}$, $D_{i,t}$ and $w_{i,t}$ time series observed for the period t=1, …, 23, the impulse response y_{t+h} is estimated with respect to a change in the regressor $X_{i,t}$ and $D_{i,t}$, to the horizon *h*=0, …, 6.

Equation (1) estimates the effect that a terrorist attack that occurs in country i, year t, has on the affected countries' tourism in the year $t + h$, using the *lpirfs* package contained in the statistical software R:

$$log\,(y_{i,t+h}) - log\,(y_{i,t}) = \delta^h X_{i,t} + \sum_{i=1}^{p} \gamma_i^h w_{i,t} + u_{i,t}^h \quad \textbf{(1)}$$

$$u_{i,t}^{h} = \lambda_{t}^{h} + \mu_{i}^{h} + \varepsilon_{i,t}^{h}$$

Equation (2) estimates the effect that a terrorist attack that occurs in country i, year t, has on the competing countries' tourism in the year $t + h$:

$$log\,(y_{i,t+h}) - log\,(y_{i,t}) = \beta^{h} D_{i,t} + \sum_{i=1}^{P} \gamma_{i}^{h} w_{i,t} + u_{i,t}^{h}$$

$$u_{i,t}^{h} = \lambda_{t}^{h} + \mu_{i}^{h} + \varepsilon_{i,t}^{h} \qquad \textbf{(2)}$$

y refers to the dependent variable; in the estimated IRFs it corresponds permanently to the annual number of international tourists that arrived in a country.

δ^{h} and β^{h} are the most relevant regression coefficients in the research since they shape the IRF – hence allows us to perceive the dynamic effect that the structural shock has on tourism and to trace the time-profile of the effects over time (when *h*=0, we are observing the impact of terrorism on the tourism industry in the shock year).

$w_{i,t}$ contains the control variables, which in this specific case will include concurrent economic shocks – GDP per capita, inflation rate, tourism and travel contribution to GDP, tourism and travel contribution to employment, capital investment in tourism and travel, government spending on tourism and travel and population.

Additionally, in all estimated regressions, country and year fixed effects – λ_{t}^{h} and μ_{i}^{h} – are controlled. Through the observation of Figure 3.1, the presence of a positive trend in the number of tourist arrivals for the countries observed can be witnessed. Therefore, to ensure that the panel units are constant, it is chosen to apply a two-way panel effect – this specification allows for controlling the effects of time and countries, removing the effects that other perceptible and distinguished shocks could have on countries' tourism.

$\varepsilon_{i,t}^{h}$ corresponds to the idiosyncratic error of the model with variance σ_{h}^{2}.

In Equation (1), the variable $X_{i,t}$ depends on the regression objective, so the calculation is constantly changing. Having defined the objectives in Section 1.2, the following models are estimated to analyze the causal relationship between tourism and terrorism:

- Effects of terrorism on the affected countries' tourism
- Effects of terrorism perpetrated by Al-Qaeda and Islamic State on the affected countries' tourism
- Effects of terrorism perpetrated by internal organizations on the affected countries' tourism

Therefore, to estimate the effect of terrorism on the tourism demand of affected countries, the discrete variable $X_{i,t}$ is equal to the number of terrorist incidents that occur in the i-*th* country in year t – we can guarantee a correct weighting of the attacks in the model estimation.

Regarding the models that differentiate the effects based on the group that committed the attack, a similar approach to the previous one is used. The difference is that in the first regression only terrorist attacks perpetrated by Al-Qaeda and Islamic State are considered to $X_{i,t}$ and in the second

regression the remaining attacks are considered – attacks committed by internal terrorist organizations originating in the affected country.

In Equation (2), $D_{i,t}$ also varies to estimate the following regression models:

- Effects of terrorism on the competing countries' tourism based on the competitiveness criteria defined in Section 3.2
- Effects of terrorism perpetrated by Al-Qaeda and Islamic State on the competing countries' tourism
- Effects of terrorism perpetrated by internal organizations on the competing countries' tourism
- Effects of terrorism on the competing countries' tourism by geographical region
- Effects of terrorism on the tourism of the safest competing countries in the world

To estimate the effect of terrorism on tourism demand of the competing countries, the discrete variable $D_{i,t}$ is equal to the number of terrorist incidents that occur in a country that competes with the i-*th* country in year t. Concerning the origin of terrorism – radical groups – the previous rationale was applied.

To differentiate the effects between the regions, the variable $D_{i,t}$ is equal to the number of terrorist incidents that occur in a country that competes with the i-*th* country in year t and it is located in the geographic area in observance. For the safest countries in the world, a similar approach is followed; the shock variable is the number of terrorist incidents that occur in a country that competes with the i-*th* country in year t for competing countries that are included in the list of the Global Peace Index.

Additionally, to complement and validate the results obtained in the principal approach – competing countries' definition was defined in Section 3.2 – two different scenarios are created, altering the criteria for defining the competition of countries:

- Effects of terrorism on the competing countries' tourism based on a boundary criterion
- Effects of terrorism on the competing countries' tourism based on a tourist product criterion

In the first scenario, countries geographically bordering the affected destinations will be considered as competing destinations. In the second scenario, the criterion is based on the tourist product offered by each country (i.e. recreational, cultural, sports, convention tourism, incentive tourism, among others). The discrete variable $D_{i,t}$ is equal to the number of terrorist incidents that occur in a country that competes with the i-*th* country in year t – only the definition of competition changes.

For the majority of the regressions, it is limited the forecast horizon to a maximum *h*=6.

Before proceeding to the model interpretation, a set of three diagnostic tests are performed: *Poolability Test*, *Breush-Pagan Test* and *Hausman Test*. The structure of the tests is in Appendix 9.1. They are used in panel time series to decide the most appropriate panel model specification. The *Poolability Test* confronts the pooled effects with the fixed effects; the *Breush-Pagan Test* verifies the difference between random-effects and pooled-effects which provides a better specification for the panel type of the model; finally, The *Hausman Test* reveals the difference between fixed-effects and random-effects which provide more consistent estimators. The tests will be implemented for all estimated models, in the shock year (*h*=0).

5. RESULTS AND DISCUSSION

This chapter presents a set of local projection results based on Equation (1) and (2). A confidence interval of 90 percent was applied to the model's explanatory variables.

5.1. EFFECT OF TERRORISM ON THE TOURISM DEMAND OF THE AGGRIEVED COUNTRY

The first estimated model intends to ascertain whether terrorist attacks – analyzing effective attacks that caused a large number of deaths and injuries – influence the tourism demand of affected countries and evaluate if the results are in accordance with most of the literature. The results are presented in Table 5.1 and Figure 5.1; it is possible to highlight and prove the existence of a significant negative relationship between terrorism and tourism in the country affected by this disaster.

Appendix 9.2.1 presents the results of the diagnosis tests applied to identify the type of panel model that should be implemented. The *Poolability Test* reveals that there is statistical evidence that the specification with fixed effects is suitable when compared to the pooled model. Additionally, the implementation of *Breush-Pagan Test* demonstrates that random effects estimators are a better specification when compared to the pooled model. As such, the *Hausman Test* was applied to define the suitable panel type between a fixed-effects or random-effects model. It was verified that a fixed-effects specification ensures the appropriateness of the interpretation of the results.

The baseline IRF in Table 5.1 corresponds to the sequence of parsimonious regressions, which was truncated at h=6 to maintain a large sample of observations and to capture a reasonable number of terrorist events for the estimation of the impulse response function. The number of terrorist events is equal to 83 in the initial year of the forecast horizon and 74 at end of the final year (at h=3 the number of attacks falls to 80).

It is clear from the time-profile of effects that terrorist attacks have a severe and short-lasting effect on tourism demand. It is important to denote that as early as the year of the shock (h=0), there is a sudden decrease in the number of international tourist arrivals to the affected country, in particular approximately 4,5 percent. It represents an abrupt reduction in tourism demand of the country affected by the terrorist attack, being the beginning of a negative trend.

The critical moment for the tourism industry is verified one year after the terrorist attack, specifically, a loss inflicted of approximately 0.87 percentage points is observed when compared to the previous year. It corresponds to a total decrease of approximately 5.3 percent decrease in the number of tourist arrivals to the affected country.

This substantial decline is proceeded by the recovery of the tourism sector in the following years. It demonstrates that the effects of terrorism on tourism are not persistent over time. Although the indicator is still below the values recorded before the shock, from the first to the second year it is possible to detect a significant growth in the number of international tourist arrivals of approximately 3.55 percentage points. Although there has been a significant increase in the number of tourists, this has not yet been sufficient to return to the original values. This situation only occurs 5 years after the terrorist attack.

Five years after the shock, tourism begins to grow on a positive note. Specifically, it is found that in the fifth year (*h*=5) there is a cumulative growth rate of the number of international tourists of approximately 1.69 percentage points. This positive trend continues, as from the fifth year to the sixth one an increase of approximately 1.04 percentage points is estimated, which totalizes a cumulative growth of approximately 2 percent in the number of international tourist arrivals to the country. Moreover, when compared to year 1 (the year where there was the largest drop in tourist flows in the affected country), the sixth year represents an 8.1 percentage points increase in tourism demand. Consequently, it can be said that tourism can recover from the harmful effects of terrorism.

From the results obtained, it can be concluded that terrorist incidents substantially influence the tourism demand of a country affected by a terrorist attack. It can be affirmed that countries confront a negative variation in the year succeeding the act of terror, however, in the following years, there is a positive variation in the number of international arrivals.

Additionally, it is important to emphasize that the interpretation of the results cannot be done for the seven horizons presented, since the coefficients are not all statistically significant, considering a 10 percent significance level.

	h=0	***h=1***	***h=2***	***h=3***	***h=4***	***h=5***	***h=6***
Model with control variables	-0.0451 **	-0.0534 ***	-0.0178 *	0.0128	0.0006	0.0170 *	0.0273 ***
p-value	0.0171	0.0025	0.0749	0.2551	0.2965	0.0606	0.0072
Number of events included	83	82	82	80	80	74	74
Number of observations included	828	811	811	801	801	762	762

Notes: These estimations are based on the Equation (1). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 1995-2017. The shock variable is effective attacks in selected countries. The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in *P-value*. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.

Table 5.1 – IRF for terrorism effects on the tourism demand of the aggrieved country

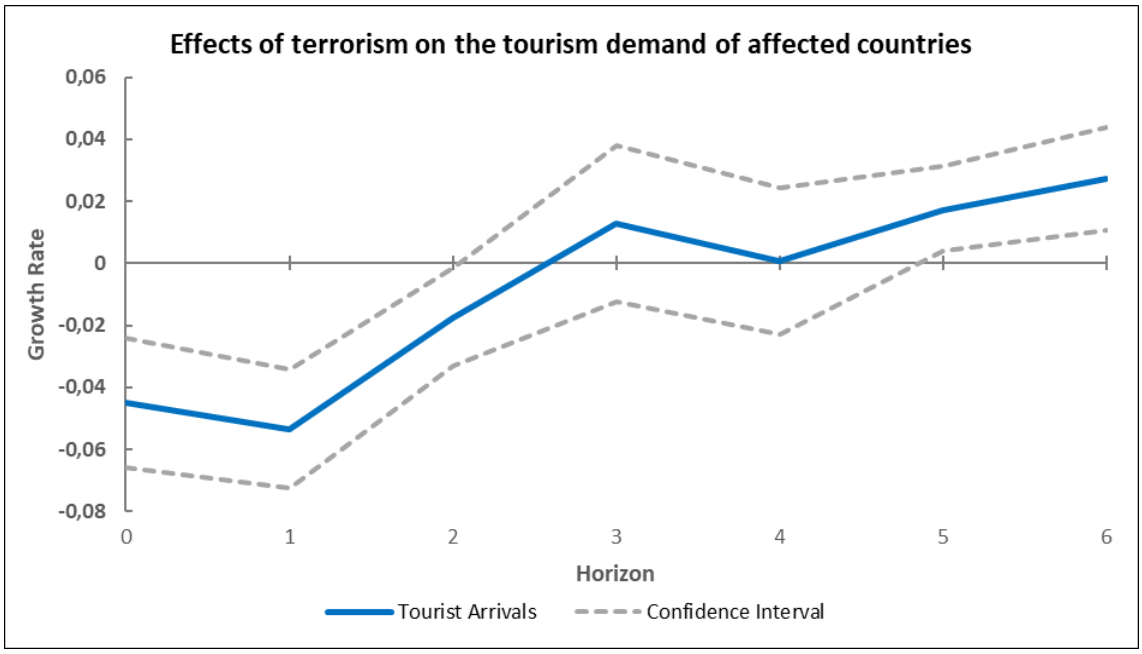

Figure 5.1 – Effects of terrorism on the tourism demand of the aggrieved country

5.1.1. Effect of Islamic State and Al-Qaeda's attacks on the aggrieved country

A second econometric model was estimated to complement the previous analysis, focusing on differentiating the impact of attacks on tourism depending on its origin and motivation. As such, it is intended to assess and quantify the impact of terrorist incidents claimed by radical groups, in particular, Al-Qaeda and the Islamic State.

The diagnosis tests – *Poolability Test*, *Breush-Pagan Test* and *Hausman Test* – were applied and the results are presented in Appendix 9.2.2. It has been verified that the estimation of the model with fixed-effects provides the most appropriate specification for the type of panel when compared to pooled-effects or random-effects.

Estimations are presented in Table 5.2 and Figure 5.2. The second IRF was truncated at h=6 to guarantee a large sample of observations and at the same time to capture a reasonable number of terrorist events claimed by radical groups. The number of terrorist events is equal to 57 in the initial year and decreases progressively to 45 in the final year.

The existence of substantial and long-lasting effects on the tourism demand of aggrieved countries triggered by the terrorism incidents claimed by radical groups has been observed.

In the shock year, there are significant changes in tourism demand of the targeted countries. An abrupt drop – approximately 3.8 percent – in the number of international tourist arrivals can be calculated.

One year after the terrorist attack (h=1), the most critical moment for the tourist sector is reached. A cumulative decrease of approximately 9.7 percent was quantified. When compared to the year of the attack (h=0), it represents a loss inflicted of about 6.5 percentage points. In practical terms, the loss in the arrival of tourists observed one year after the terrorist attack corresponds to three times greater than that verified in the shock year – a negative variation of approximately 202 percent.

From the second year, a reversal in the negative trend on tourism demand is identified. Two years after the terrorist attack, a rise of around 2.9 percentage points is estimated when compared to the previous year. This moment represents the greatest recovery of the tourism sector, however, not enough to achieve tourism values before the terrorist attack, since a cumulative decrease of approximately 6.7 percent in tourism is still observed.

In the following years, a gradual and stable recovery trend is noticed. For instance, from the second to the third year a slight increase of approximately 0.4 percentage points is observed; additionally, from the third to the fourth year a raise of around 2.59 percentage points is quantified.

Lastly, it is relevant to note that despite the favorable evolution of tourism demand, 5 years after the terrorist attack acclaimed by Islamic radical groups, negative effects on the tourist sector of the target countries continues to be reported – contributing to a decrease of approximately 1.1 percent. A continuation of this positive trend is expected, allowing tourism to return to its original values.

When the results obtained are compared to the previous estimated model, one can conclude that terrorist incidents claimed by Islamic State and Al-Qaeda also substantially influence the tourism demand of a country affected by this attack and, on average, have a more significant and persistent influence over time.

	h=0	***h=1***	***h=2***	***h=3***	***h=4***	***h=5***	***h=6***
Model with control variables	-0.0321 **	-0.0969 ***	-0.06716 ***	-0.06308 **	-0.03716 **	-0.0109 *	0.00101
p-value	0.0383	0.0012	0.0001	0.0179	0.0491	0.0973	0.3627
Number of events included	57	57	54	53	49	47	45
Number of observations included	828	828	786	765	722	698	641

Notes: These estimations are based on the Equation (1). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 1995-2017. The shock variable is the effective attacks claimed by Al-Qaeda and Islamic State organizations in selected countries. The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in *P-value*. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.

Table 5.2 – IRF for effect of Islamic State and Al-Qaeda's attacks on the aggrieved country

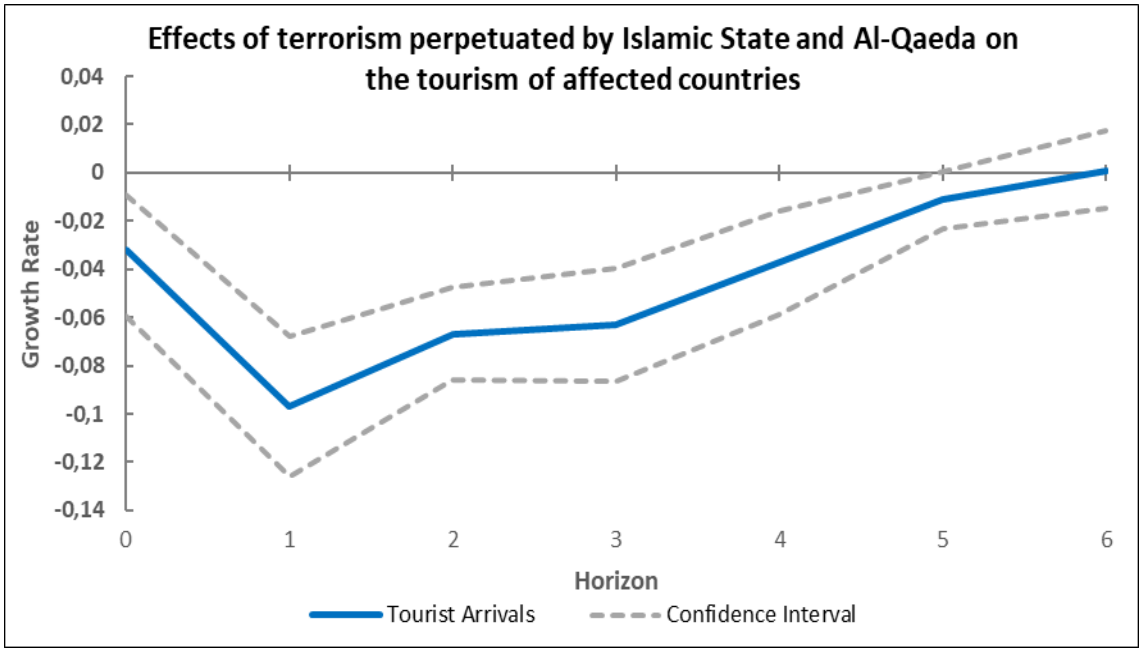

Figure 5.2 – Effect of Islamic State and Al-Qaeda's attacks on the aggrieved country

5.1.2. Effect of internal radical groups' attacks on the aggrieved country

A third model was estimated to describe and quantify the influence that terrorist incidents acclaimed by radical groups different from Al-Qaeda and Islamic State have on the tourist sector of the affected countries.

The diagnosis tests – *Poolability Test*, *Breush-Pagan Test* and *Hausman Test* – were applied and the results are presented in Appendix 9.2.3. It has been verified that the estimation of the model with fixed-effects provides estimators which are more consistent and accurate when compared to pooled-effects or random-effects.

Table 5.3 and Figure 5.3 present the output of the estimations. To guarantee a sufficient number of observations and events in the analysis, a maximum horizon of 6 was defined. For this reason, the results can be statistically significant and consequently interpretable.

Through the analysis of Figure 5.3, it is possible to visualize the negative impact that terrorist attacks acclaimed by radical groups which do not include members of Al-Qaeda or Islamic State have on tourism. However, when contrasted with the previous model, one can affirm that the effect is characterized by being less intense and persistent in time.

It can be noted that in the first years after the terrorist attack occurred, there is a substantial reduction in tourism demand from these affected countries. For instance, in the shock year, a reduction of approximately 5.04 percent in the number of international tourist arrivals was quantified. One year after the shock, a slight recovery in tourism can be observed; specifically, an inflicted increase of around 3.5 percentage points compared to the previous year (h=0). Despite this increase, tourism continues to grow on the negative ground. A loss of approximately 1.55 percent in tourism has been calculated.

The following years are characterized by the return of the tourist sector to the original values before the shock. Three years after the terrorist incident, an increase of approximately 1.8 percent in the country's cumulative tourism demand is quantified. It is important to enhance that from the moment the terrorist attack occurred until the third year there was a significant recovery – approximately 6.8 percentage points – in the tourism of the targeted country. In the subsequent years, the changes in countries' tourism demand remain stable.

It is possible to extrapolate that the effects in the country affected by a terrorist attack carried out by organizations not belonging to Al-Qaeda and Islamic State normally are not so intense and the country's tourism can recover rapidly.

	h=0	***h=1***	***h=2***	***h=3***	***h=4***	***h=5***	***h=6***
Model with control variables	-0.0504 *	-0.01553 *	-0.00729	0.017606 *	0.00794	0.003537	0,00904 *
p-value	0.0820	0.0948	0.4639	0.0716	0.1694	0.2486	0.0820
Number of events included	26	24	23	23	23	19	17
Number of observations included	828	787	756	756	756	702	653

Notes: These estimations are based on the Equation (1). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 1995-2017. The shock variable is the effective attacks motivated by internal organizations in selected countries. The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in *P-value*. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.

Table 5.3 – IRF for effect of internal radical groups' attacks on the aggrieved country

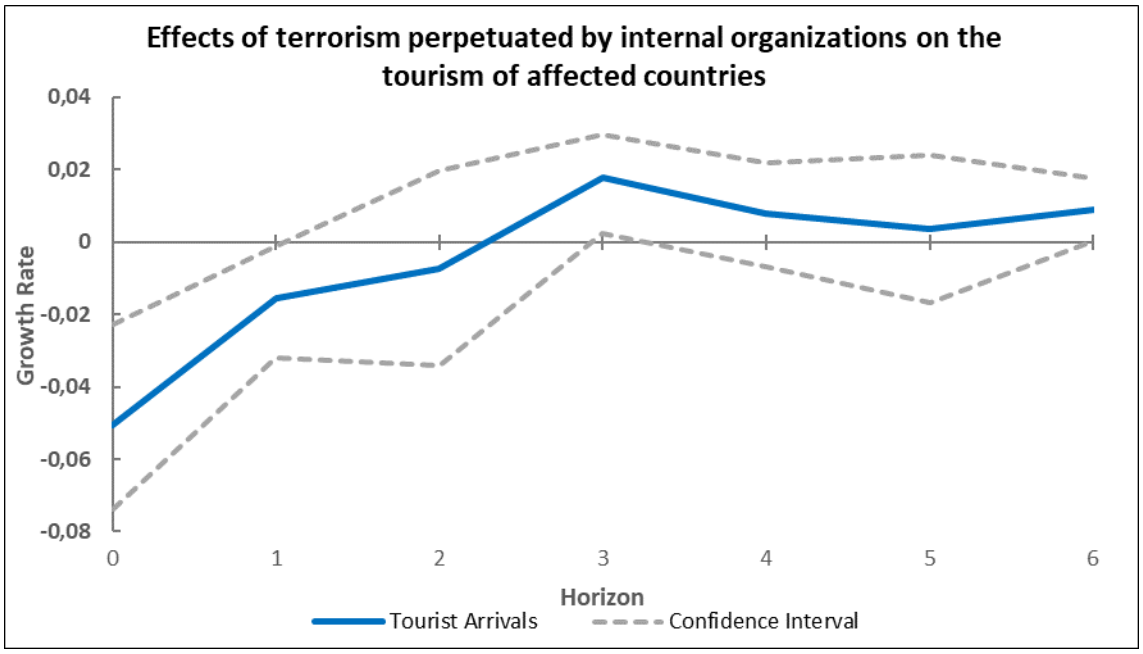

Figure 5.3 – Effect of internal radical groups' attacks on the aggrieved country

5.2. EFFECT OF TERRORISM ON TOURISM DEMAND OF THE COMPETING COUNTRIES

Having analyzed the effect that terrorism represents on the tourism demand of the target country, now it is preponderant to assess and quantify the effect that the shock caused by the terrorist attack has on the tourist sector of the competing countries of the target country, which have similar benefits to tourists and usually have an image of greater security and stability when compared to the affected country.

The diagnosis tests – *Poolability Test*, *Breush-Pagan Test* and *Hausman Test* – were applied to accurately define the local projections approach. The results are presented in Appendix 9.2.4. It is verified that the estimation of the model with fixed-effects provides the most appropriate specification for the panel type when compared to pooled-effects or random-effects. Therefore, the effects of time and countries are controlled.

The fourth estimated model results are presented in Table 5.4 and Figure 5.4. It is possible to detect the existence of a significant positive relationship between the terrorist incidents that take place in a country and the tourism demand of the competing countries of that destination affected by the disaster. This can be promptly and intuitively verified by observing Figure 5.4, as the line representing tourism demand is assuming positive values on average.

There is a substantial increase in the number of tourist arrivals of competing countries over the years succeeding the terrorist attack. The positive effect of terrorism has been estimated to a maximum point two years after the attack; in particular, an increase in tourist arrivals of approximately 4.65 percent is estimated (h=2).

Until reaching the maximum value, there is a gradual growth of the tourism variable. In the shock year (h=0) there was an increase in tourist flows of competing countries by approximately 3.1 percent. This is a significant increase in such a short period.

In the subsequent year (h=1), although this growth trend continued, the rate decelerated, with an increase of only 0.7 percentage points. From the first to the second year after the shock, another increase of approximately 0.7 percentage points has been estimated. From the year of the event to the second year after the attack, tourism demand from competing countries has almost doubled.

After reaching the maximum value at h=2, there is a slowdown in the flow of tourists to countries competing with the country affected by a terrorist incident. However, it remains positive which means that the volume of tourists in competing countries is higher than the one quantified before the terrorist attack. This might induce the loyalty of travelers to the new destination.

More specifically, from the second to the third year, there was a decrease of approximately 1.54 percentage points; analogously, from the third to the fifth year, there was a slight decrease of 1.17 percentage points; and, from the fifth to the sixth year another insignificant loss of 0.5 percentage points was quantified. However, on average, 6 years after the terrorist attack the tourism demand of the competing countries still benefits from an increase of approximately 1.43 percent.

One can conclude that terrorism in a country positively affects the tourism demand of its competing countries, which usually provides tourist products with similar benefits. It is characterized by a severe

and long-lasting effect on the tourism of competing countries since although the impact tends to fade over the next 6 years, it always has a positive effect, indicating a persistent effect.

	h=0	*h=1*	*h=2*	*h=3*	*h=4*	*h=5*	*h=6*
Model with control variables	0.031738 *	0.03905 **	0.04645 **	0.03106 *	0.0099	0.01929 *	0.01429 *
p-value	0.0745	0.0416	0.0172	0.0823	0.1465	0.0694	0.0994
Number of events included	281	281	263	258	239	230	219
Number of observations included	828	828	804	771	758	740	738

Notes: These estimations are based on the Equation (2). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 1995-2017. The variable shock is the interaction of the variable effective attack and competing country. This means that when a terrorist attack occurs in a given year *t* and in a country i which competes with the affected one, the variable presents the shock. The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in P-value. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.

Table 5.4 – IRF for terrorism effects on tourism demand of the competing countries

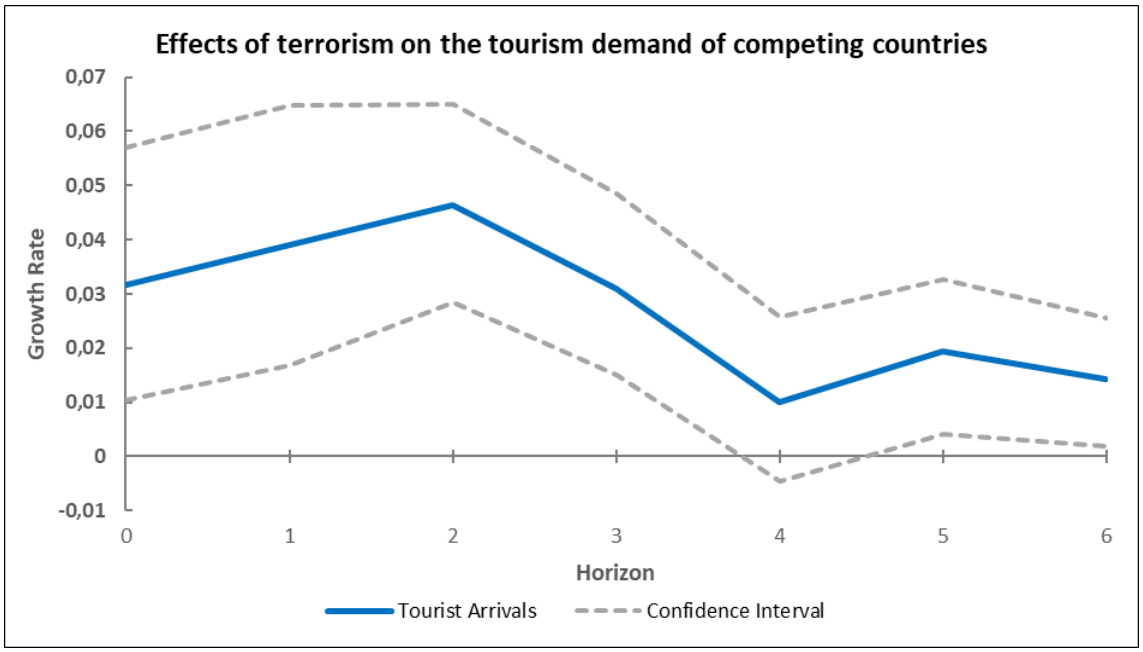

Figure 5.4 – Effects of terrorism on tourism demand of the competing countries

5.2.1. Effect of Islamic State and Al-Qaeda's attacks on the competing countries

Having proven the positive impact on the tourism demand of competing countries as a result of a terrorism act, it is now important to complement the analysis, by perceiving and quantifying the influence that attacks carried out by Al-Qaeda and Islamic State – the most recognizable radical groups worldwide – have on tourism demand of competing countries.

Following the previously defined methodology, the diagnosis tests – *Poolability Test*, *Breush-Pagan Test* and *Hausman Test* – were applied and the results are presented in Appendix 9.2.5. It is verified that the estimation of the model with fixed-effects provides estimators more consistent and accurate results when compared to pooled-effects or random-effects.

The impulse response function in Table 5.5 presents the estimation for this specific model. A maximum horizon of 6 was defined for the analysis to guarantee that the number of observations and terrorist incidents is sufficient.

It is clear from the time-profile of effects that terrorist attacks claimed by Al-Qaeda and the Islamic State have a severe and long-lasting effect on tourism demand of competing countries. This effect is not noticed in the shock year, since there is a short increase of only 0.75 percent in the tourism demand of competing countries.

However, one year after the event, the positive effect is estimated to reach its maximum value; an inflicted growth of approximately 2.76 percentage points is notable, compared to the preceding year. In cumulative terms, it can be affirmed that attacks claimed by Al-Qaeda and the Islamic State contribute to increasing the tourism demand of the substitute countries by about 3.5 percent, just one year after the violent event.

It is demonstrated that the tourism industry in competing countries has benefited from a growth in this sector that more than quadrupled when compared to the year in which the terrorist attack occurred. It is evidenced by the substantial increase in tourism demand of competing countries as a result of the shock in tourist destinations.

From the first to the second year, there was a slight decrease of approximately 0.53 percentage points. In the following years, it has maintained a tendency to decrease the growth rate of the tourism industry. However, it is relevant to denote that these are minor declines, and it can be said that tourism demand remains relatively stable over time, with significant positive values. For instance, from the second to the third year, there was an inappreciable decrease of only 0.46 percentage points, which is reflected above.

Five years after the terrorist attack, an increase of approximately 1.91 percent in tourism demand of the competing countries is still detected. Unexpectedly, from the fifth to the sixth year, a residual increase of around 0.34 percentage points is calculated.

It can be underlined that these organized groups – that intend to attract a greater global media coverage and to disseminate a message of insecurity worldwide – contribute to an immediate and significant increase in the tourism industry of competing countries. Comparing to the previous estimated model, one can verify that the impacts caused by incidents with the characteristics described above have a more significant intensity over time. It is proven that catastrophic events perpetrated by Al-Qaeda and the Islamic State lead tourists to instinctively alter and replace tourist destinations affected by their competitors.

	h=0	*h=1*	*h=2*	*h=3*	*h=4*	*h=5*	*h=6*
Model with control variables	0.0076 *	0.0352 *	0.0299 **	0.0253 *	0.0043	0.0192 *	0.0226 **
p-value	0.0965	0.0611	0.0475	0.0935	0.3662	0.0818	0.0258
Number of events included	185	185	161	144	122	101	89
Number of observations included	828	828	794	761	722	698	667

Notes: These estimations are based on the Equation (2). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 1995-2017. The shock variable is the effective attacks claimed by Islam-oriented organizations in the competing countries of the targeted destinations. The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in *P-value*. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.

Table 5.5 – IRF for Islamic State and Al-Qaeda attacks effects on the competing countries

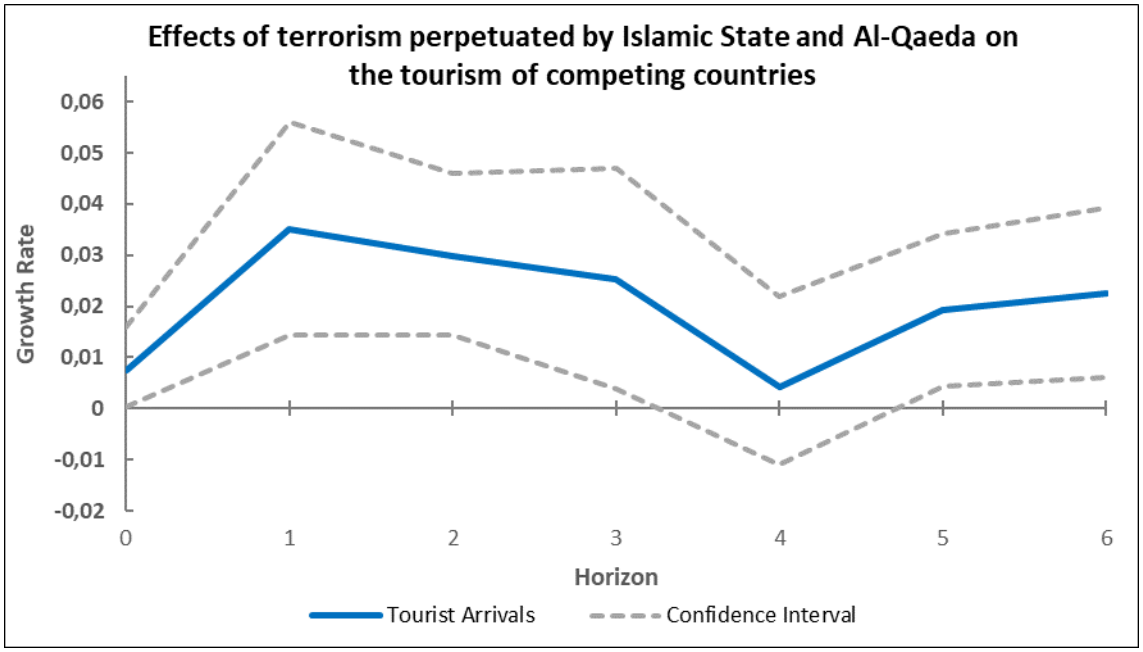

Figure 5.5 – Effect of Islamic State and Al-Qaeda's attacks on the competing countries

5.2.2. Effect of internal radical groups' attacks on the competing countries

This econometric model aims to assess and quantify the influence that terrorist attacks perpetrated by radical groups different from Al-Qaeda and Islamic State – alternatively stated as internal organizations motivated by political, cultural, and social conflicts – have on the tourism demand of competing countries. The main objective is to provide complementary information to the first estimated model, regarding the general impact that these incidents have on tourism in competing tourist destinations.

Following the previously defined methodology, the diagnosis tests – *Poolability Test*, *Breush-Pagan Test* and *Hausman Test* – were applied and the results are presented in Appendix 9.2.6. One can

verify that the estimation of the model with fixed-effects provides more consistent and accurate estimators when compared to pooled-effects or random-effects.

Through the analysis of Table 5.6 and Figure 5.6, it is also possible to reveal the presence of an association between terrorist attacks carried out by these groups and tourism in competing countries. Incidents contribute to significant positive oscillations in the arrival of tourists to competing countries. However, the influence is not lasting.

A substantial increase in the number of tourist arrivals of competing countries between the shock year and the subsequent year should be highlighted; an increase of approximately 2.4 percent in the tourism demand of the competing country was estimated. One can observe that the maximum value in the growth of tourism demand is obtained one year after the occurrence of the terrorist attack. However, the following years are characterized by a reversal in the positive trend.

The effects start to fade over time and to be volatile. For instance, from the first to the third year after the terrorist attack, a decrease of around 0.72 percentage points in tourist arrivals is estimated. Inclusively, it is observable that in the fourth and sixth year after the terrorist attack, on average, there are insubstantial losses in tourism of competing countries, of approximately 1.03 percent and 1.26 percent, respectively.

The effects of terrorism on tourism of competing countries have been proven, however, it has also been demonstrated that the impact of terrorist attacks normally motivated by internal political, cultural or social conflicts do not have such a significant influence as those claimed by the Al-Qaeda and Islamic State. These differences are related to smaller magnitudes and shorter periods of influence.

	h=0	***h=1***	***h=2***	***h=3***	***h=4***	***h=5***	***h=6***
Model with control variables	0.02227 **	0.0239 *	0.00292	0.0167 ***	-0.01038 **	-0.002	-0.0123 *
p-value	0.0343	0.0818	0.2843	0.0091	0.0197	0.5492	0.0937
Number of events included	96	88	76	62	58	55	49
Number of observations included	828	803	781	753	724	711	697

Notes: These estimations are based on the Equation (2). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 1995-2017. The shock variable is the effective attacks claimed by internal organizations – motivated by political, cultural and social issues – in the competing countries of the targeted destinations. The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in *P-value*. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.

Table 5.6 – IRF for effects of internal radical groups' attacks on the competing countries

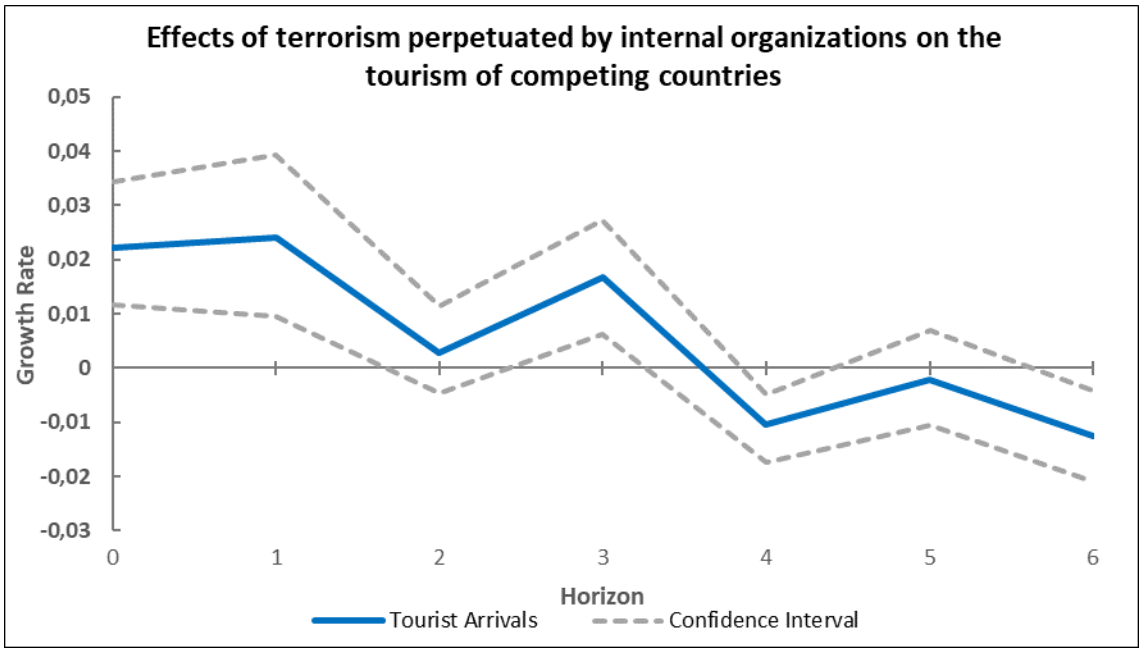

Figure 5.6 – Effect of internal radical groups' attacks on the competing countries

5.2.3. Regional effects on the competing countries

A set of five models have been estimated to assess and differentiate the impact that terrorist attacks have on the tourism demand of the competing countries in different regions of the world, perceiving and identifying geographical areas that are more susceptible to benefit from the occurrence of a terrorist event.

Following the previously defined methodology, the diagnosis tests – *Poolability Test*, *Breush-Pagan Test* and *Hausman Test* – were applied. Results can be analyzed for each region in Appendix 9.2.7. For each estimation, it is verified that the estimation of the models with fixed-effects provides estimators more consistent and accurate results when compared to pooled-effects or random-effects.

Figure 5.7 presents the estimated econometric models for each analyzed region of the world – East Asia & Oceania, America, North of Europe, South of Europe and Middle East & North of Africa. The IRFs are in Appendix 9.3.1. To assure a reasonable number of terrorism events and observations, a maximum of 6 horizons was defined.

In general, the estimated models demonstrate a similar behavior pattern to the one estimated in Section 5.2 – specifically, regions have a considerable increase in tourism demand in the first years, however in the subsequent ones the effects start to fade. The differences between the models reside, essentially, in the magnitude and duration of the impact.

Competing countries located in the region of East Asia & Oceania are the ones that most benefit from terrorism incidents. In the shock year, a resounding increase in tourist arrivals of around 24.75 percent is quantified – this represents a profound change in the tourism conjecture of these countries. However, in the succeeding years, there is a slowdown in the growth trend, which means that 4 years after the event, losses – of approximately 19 percent – are calculated in the tourism of

competing countries located in this region. It can be concluded that the effects are severe, but short-lasting.

Regarding the region of America, in the 6 years under analysis, one can affirm that terrorism in the competing countries of this geographical area has a continually positive influence on tourism, with the exception of horizon 4 for which it is not possible to interpret the results, because it is not statistically significant. The IRF evidence shows that until the first two years after the terrorist attack there has been a progressive growth in the number of international tourists replacing the affected country by America, reaching a maximum increase of approximately 6.5 percent. In the subsequent years, although the rate decelerated, positive impacts on tourism are still observed – as such, a shock that takes place in countries competing with America contributes to a generalized and persistent increase in tourism demand of their competitors.

The estimation for the region of Northern Europe is characterized by a totally different tourism behavior when compared to the other regions. In the shock year, a sharp decrease has been calculated – of approximately 3.5 percent – in the tourist flow to competing countries. Although in the following years, there is a progressive recovery in tourism, one year after the terrorist attack, it is not growing on positive ground – a loss of 1 percent is quantified. Improvements in tourism demand of competing countries located in the North of Europe are only observed four years after the terrorist attack.

Competing countries located in the South of Europe return to the generalized pattern of behavior. The year succeeding the terrorist incident reveals a rapid increase – of approximately 1.9 percent – in the tourism demand of these countries. However, the subsequent years reveal a reversal in this growth trend; more specifically, in the third year after the terrorist attack, an accentuated drop in the tourist arrivals can be observed – of around 1.6 percent – which continues in the following years. It demonstrates the volatility and positive momentary effect that terrorist attacks in a specific destination have on the tourism industry of their competing countries located in the South of Europe.

The region of Middle East & North of Africa – constituted mainly by less developed countries, which offer more competitive tourist products and prices – benefits severely and continuously from the occurrence of a terrorist attack on its competitor. For instance, one year after the violent event, a remarkable increase of approximately 6.9 percent is estimated. Although in the following years, the growth rate decelerates, 5 years after the occurrence of the terrorist attack there is still a positive influence of approximately 8.6 percent. Therefore, it can be concluded that there is a positive and long-lasting effect on the tourism demand of competing countries located in Africa and the Middle East.

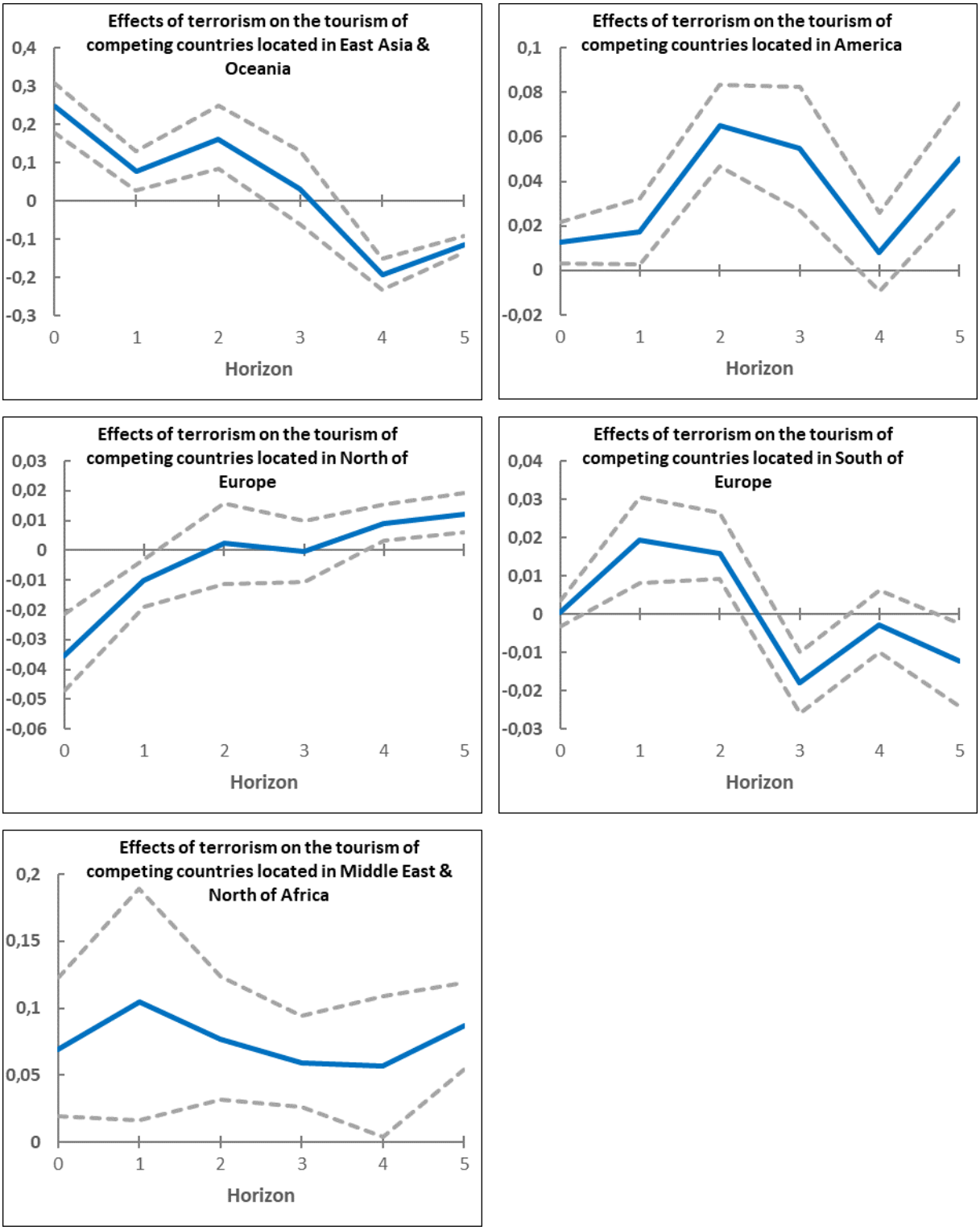

Figure 5.7 – Regional effects on the competing countries

5.2.4. Terrorism effects on the safest competing countries

This model was estimated to evaluate and validate the results obtained in the previous estimations. Table 5.7 presents the IRF obtained for the prediction of the effects that terrorism on specific tourist destinations has on tourism demand of its main competitors, which are considered the safest worldwide. As a consequence, the events of terrorism associated with the 9 safest countries in each year, starting in 2008, were considered – the selection of countries was based on the GPI, a world's leading measure of global peacefulness for each country.

Through the observation of Figure 5.8, it is possible to visualize the existence of a clear positive association between the occurrence of terrorism incidents and the alteration of tourism demand on competing countries; in particular, in the shock year, an abrupt increase in the tourism industry of 12.2 percent is quantified.

The subsequent years are characterized by an insubstantial deceleration in the growth rate of tourist arrivals in the safest competing countries. For instance, two years succeeding the incidents a sharp rise of approximately 11 percent in tourism of competing countries considered the safest is still calculated. From the third year, the effects start to fade following the trend observed in Section 5.2.

The significant contribution that terrorism events have on the tourism industry of competing countries is unquestionable, being even more notorious in competing countries considered the safest in the world. When compared to regression in Section 5.2, in earlier years, the intensity of the effects is calculated, on average, to more than double – for instance, two years after the shock, the difference recorded between the models is approximately 6.5 percentage points.

The estimated IRF allows concluding that tourists choose to tightly replace destinations affected by terrorism events by their competing countries which present high levels of security and stability.

	h=0	***h=1***	***h=2***	***h=3***	***h=4***	***h=5***	***h=6***
Model with control variables	0.12216 **	0.08569 **	0.11137 *	0.07012 *	0.01101	-0.0037	0.01933
p-value	0.0186	0.0491	0.0923	0.08032	0.5576	0.4205	0.3863
Number of events included	80	80	80	71	71	59	51
Number of observations included	828	828	828	794	794	770	761

Notes: These estimations are based on the Equation (2). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 2008-2017. The shock variable is the effective attacks in the competing countries of the targeted destinations which are located in the safest countries in the world according to the Global Peace Index (GPI). The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in *P-value*. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.

Table 5.7 – IRF for terrorism effects on the safest competing countries

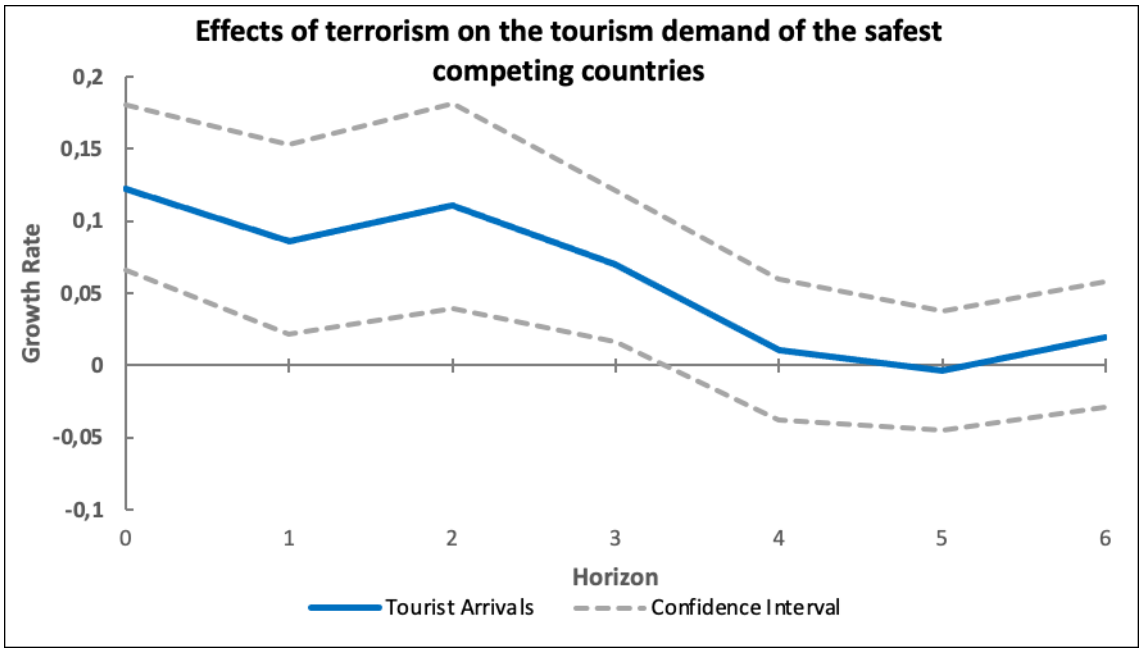

Figure 5.8 – Terrorism effect's on the safest competing countries

5.3. SCENARIO 1: TERRORISM EFFECTS ON NEIGHBORING COUNTRIES

This model intends to create an alternative approach in analyzing the impact of terrorism on tourism in competing countries, complementing the first scenario (Section 5.2). Therefore, countries that geographically delimit destinations affected by terrorist events were considered as competing destinations.

The diagnosis tests – *Poolability Test*, *Breush-Pagan Test* and *Hausman Test* – have been applied. The results are presented in Appendix 9.2.9. Following the previous rationale, it was verified that a fixed-effects specification should be used to ensure the appropriateness of the results. Therefore, the model was estimated, and the results are obtainable in Appendix 9.3.2.

It is clear from the time-profile of effects that terrorist attacks have a severe and nonpersistent effect on tourism demand of neighboring countries. The structural changes in tourism indicators are evidenced principally in the year of the terrorist attack and the subsequent one.

In the shock year(h=0), there is a sharp increase in the number of international tourist arrivals to neighboring countries, in particular approximately 3,8 percent. One year after the terrorist attack, the maximum value of improvement in tourism demand is reached – a total percentage increase of approximately 6.5 percent – that demonstrates the significant positive contribution that terrorism has on the tourist industry of the border countries.

From the second year onwards, there is an inversion in the growth of tourism demand for these destinations; successive decreases in tourism demand from neighboring countries are observed. For instance, three years following the terrorist event (h=3), there is a direct contribution of 1.13 percent, which corresponds to a loss inflicted of 1.3 percentage points. Additionally, it is estimated that the fifth and sixth years following the terrorist attack start to have a negative influence on tourism of neighboring countries – a total decrease of approximately 1.18 and 3.35 percent.

The results demonstrated that tourism in the countries that delimitate the destinations affected by terrorist attacks is substantially benefited in the first years. This model validates and reinforces the one estimated in scenario 5.2 since the results converge to identify the sharp and positive effects in tourism demand of competing countries caused by terrorism events. The differences between the models are essentially associated with the magnitude and the duration of the effects – the first scenario reveals more intense impacts.

5.4. SCENARIO 2: TERRORISM EFFECT'S ON COMPETING COUNTRIES WITH SIMILAR TOURIST PRODUCT

This model intends to create another alternative to analyze the effects that terrorism has on the tourism of competing countries of the affected country. This estimation considers that countries compete against each other based on the tourism products provided by each one. It complements and validates the first scenario (Section 5.2); a tourism product being a decisive factor for choosing a destination, it will be examined unitarily.

The diagnosis tests – *Poolability Test*, *Breush-Pagan Test* and *Hausman Test* – have been applied. The results are presented in Appendix 9.2.10. Following the previous rationale, it was verified that a fixed-effects specification model should be used to ensure the appropriateness of the results. Therefore, the model was estimated, and the results are obtainable in Appendix 9.3.3.

It is clear from the time-profile of effects that terrorist attacks have a severe and nonpersistent effect on tourism demand of competing countries. In the year of the shock (h=0), there is a notable increase of approximately 5.1 percent in the tourism industry, which demonstrates the immediate change in the travelers' decision making to replace the affected destination by their competitors who offer similar tourism products. This positive trend remains one year after the terrorist attack.

Analogously to the previous scenario, it was observed that from the second year after the terrorist attack there is a progressive decrease in the growth of tourism demand from competing countries, demonstrating the continuous loss of shock intensity. From the second to the third year, there was an inflicted loss of approximately 2.5 percentage points. This negative trend contributes to 6 years after the terrorism event, a significant decrease of around 4 percent is observed in the tourism of competing destinations.

The results confirmed that the tourism of the competing countries – which provide a similar tourist product to the affected country – is improved by the occurrence of terrorism events. The results are in accordance with previously obtained scenarios (i.e. Section 5.2 and 5.3). Comparing with the first scenario, it can be verified that, on average, a slighter magnitude and persistence are observed. Therefore, this model once again validates and reinforces the results of the first scenario and guarantees robustness to the interpretation of the results.

6. CONCLUSIONS

Several studies analyzing the impacts of terrorist attacks on tourism have been conducted; however, there are still some gaps that have to be explored – specifically, establishing connections between the occurrence of terrorism in certain regions and the variation of tourism demand in geographic areas related to the affected one.

This paper deals with the empirical research on the dynamic causal relationship between terrorism and international tourist arrivals, using Local Projections. The main objective was to test the hypothesis that terrorism contributes to a change in a country's tourism demand, analyzing two perspectives: the influence on the tourism industry of the attacked country as well as on the tourism demand of their competing countries. To achieve that, a sample of relevant tourist destinations indicators was selected, from 1995 to 2017.

As far as the effects of terrorist attacks on tourists' arrivals of the targeted country are concerned, the existence of a negative causal relationship has been concluded. Terrorism leads to a significant decrease in the number of international tourists, representing a sharp decrease in revenue generated by the tourism sector for the country's economy – it contributes to undermine the financial and economic sustainability of a country. The research results are in accordance with the literature reviewed in Section 2, since the majority of authors refer that terrorism negatively affects tourism in the target country and its impact can be characterized as significant (Buigut & Amendah, 2015; Feridun, 2011; Yap & Saha, 2013).

It is important to emphasize that although the effects of terrorism are immediate – a significant decrease was quantified as soon as the shock year occured– they are characterized by being short-lasting, since from two years after the terrorist attack there is a gradual recovery in the number of international tourists arriving in the affected country. These findings are also in line with what is exposed in the literature (Llorca-Vivero, 2008; Raza & Jawaid, 2013).

This research summarizes another relevant conclusion of the scientific literature. It was proven that terrorist attacks perpetrated by radical groups linked to Al-Qaeda or Islamic State – the most feared organizations worldwide – have a more intense and persistent influence on the tourism demand of affected countries. To validate the previous finding, it is also concluded that terrorist attacks perpetrated by individuals or groups originated in the affected country – motivated essentially by social, cultural or political issues – have a less harmful effect on the tourism industry.

This dissertation demonstrates that the group that perpetuates the terrorist attack is a determining factor of tourism demand. These findings confirm the theory that international media indirectly play a leading role in choosing a tourist destination (Cousins & Brunt, 2002). Terrorist attacks committed by Al-Qaeda or Islamic State receive greater attention from the mass media influencing tourist perceptions and creating an image of insecurity and instability associated with the affected country, which prevents tourists from traveling there.

The research results prove the existence of a positive relationship between the occurrence of terrorist attacks in a country and the tourism demand of their competitors' countries. It is concluded that the impact of a terrorist attack on the tourism demand of competing countries has a significant

and long-lasting effect. Additionally, it is noteworthy that the impact is observed immediately in the shock year.

The findings are in line with the reviewed literature, since the existence of spillover effects have been confirmed, demonstrating that terrorism in a country contributes to altering the tourist's demand of other tourist destinations (Bassil, 2014; Drakos & Kutan, 2003; Frey et al., 2004). However, this dissertation extrapolates deeper conclusions, since it has been proven that a terrorist incident in a specific country leads to a significant increase in the number of international tourist arrivals to their competing countries – it evidences the presence of substitution effect.

The two alternative scenarios estimated for the definition of competition also complement, validate and provide robustness to the general model, since changing the criteria for defining competitors, convergent conclusions are obtained.

The presence of a strong positive relationship between the occurrence of a terrorist attack and the tourism demand of destinations that are geographically delimitated by the affected country has been confirmed. Compared to the first scenario, there are differences in the intensity and duration of the effects – it can be explained because there are neighboring countries that benefit from being geographically close and others are considered potential risk destinations (Araña & J. León, 2008). Additionally, it is concluded that terrorism contributes to improving tourism in competing countries that present a similar tourism product – having a similar pattern behavior to the one previously estimated.

Another consideration identified is the strongly significant positive contribution that a terrorist attack has on the tourism demand of its competing countries, considered the safest in the world – according to the GPI index. It highlights the importance that security and risk perception of a destination has at the moment of choosing a tourist destination by the tourist (Dholakia, 2001).

This dissertation also differentiates the general effect on competing countries based on the entities that perpetuated the terrorist attacks. It is concluded that terrorism acclaimed by Islamic State and Al-Qaeda undoubtedly benefits tourism from competing countries – these radical groups urge tourists to instantly and strongly replace the affected destination by its competitors. Contrarily, the remaining terrorist attacks – commonly committed by individuals or groups originating in the target country – are characterized by positive flatter effects.

The tourism industry of competing countries by geographic regions presents a similar behavior pattern, meeting the estimated general behavior model. One exception is the region of East Asia & Oceania, where it is estimated that increases in tourism demand are double those estimated in the general model – this situation might occur because tourists substitute affected destinations by Australia and New Zealand, which have low levels of terrorist activity. Another exception is Northern Europe where losses in tourism demand from competing countries are recorded in the first years after the shock.

This dissertation explains the gradual positive evolution that has been observed in global tourism over the last years and the prospects of substantial growth estimated (UNWTO, 2019b). Contrary to expectations – that terrorism would inhibit the flow of international travelers – tourists do not stop

traveling. Alternatively, tourists substitute affected countries with their competing tourist destinations, which offer similar benefits with greater security and stability for tourists' stay.

It can be concluded that tourists choose a destination where risk perception is lower. It reinforces the literature since it is proven that the perceived risk of terrorism severely influences tourists' behaviors and decision-making (Cláudia Seabra et al., 2014).

The present study evidences a strong dichotomy: the decline in the country's tourist industry as a result of a terrorist attack contributes to the rapid and substantial growth of tourism demand of its competitors; for a tourist market to improve, another has to deteriorate. It confirms that tourism is a highly competitive industry.

Several contributions can be considered in this dissertation. Firstly, this research allowed us to evaluate and quantify the impact of terrorist incidents on the tourism demand of competing countries. Secondly, it was feasible to distinguish between internal and external shocks, specifically to determine that there are differences based on the terrorist group that perpetuated the attack – Islam-oriented organizations and internal organizations. Thirdly, this research enables to differentiate the impact that terrorism has on competing countries by the geographic area and the associated security level; and ultimately, it allowed the implementation of a recent econometric methodology that had never been applied in tourism and which allowed for consistent and revealing results.

6.1. IMPLICATIONS

The results of this research reveal that authorities must deal with terrorist attacks decisively, to protect the tourism industry. Policy-makers should emphasize the safety and security of tourist destinations. Therefore, this study proposes and discusses several marketing, economic, and security policies that can be implemented by policymakers to better respond to all shocks that can affect the tourism sector, positively or negatively. Governments should be proactive in reducing the consequences of terrorist activities to further boost tourist arrivals and the country's earnings, referring not only to the governments of the affected countries but also to the competing countries.

The marketing policy should be implemented to correct biased and distorted images after a terrorist attack, and it must cover both the short and long terms. In the short term, tourism sector authorities must develop a communication policy to improve the image of the attacked country as an excellent tourism destination. In the long term, tourist institutions must develop a marketing strategy to attract potential markets and to reduce the risks of an over-dependence of specific tourist markets.

On the other hand, governments of competing countries might define an acquisition strategy to demonstrate to tourists that they are a secure destination with similar benefits. Developing marketing plans and strategies is important to ensure that the gains from terrorism in the competing country are sustained for the long run: international campaigns can be beneficial, demonstrating the tourist attractions, equipment and services that are available in the competing countries.

In terms of security policy, one can argue that the strategy that must be undertaken by affected countries and their competing countries is to invest in the internal security and the level of cooperation and communication with foreign governments – for instance, through diplomatic missions – to help to attenuate the impact of shocks on tourism activity.

Regarding economic policy, affected countries and their competing countries must make adjustments to their prices. Contrarily, a typical strategy adopted might involve a generalized reduction in prices to efficiently attract tourists to return to the tourist destination – affected countries – or attract new potential tourists – competing countries. Additionally, countries with a higher probability of terrorism occurring should preserve an amount in their annual budget to be able to rapidly use these funds to invest in the country's recovery, being financed during periods of high tourism demand to act as a shock absorber during transitional periods of crisis.

7. LIMITATIONS AND RECOMMENDATIONS FOR FUTURE WORKS

The first limitation refers to the research settings, namely the fact that the study only considers a sample of 36 countries and a 7-year time lag. Although it presents a sufficient number of observations to correctly apply the methodology, a larger number of countries analyzed would converge and extrapolate even more truthful and reliable results that could reveal possible disparities in the effect that terrorism has on the number of arrivals of tourists around the world. A broader period of analysis could prove the relevance of additional factors like price level, crime rates, accommodation profit and price effect registered in countries, among others.

The second limitation is related to the literature that exists on the definition of competing countries. There is no widely accepted definition of competitiveness. The third limitation is related to the estimation of regional effects on the competing countries. The small number of countries leads to results to be not as accurate and robust as expected.

The last limitation considers the estimation for the safest countries in the world based on the Global Peace Index. This quantitative indicator has been available since 2008. The period under observation is shorter when compared with other regressions, and therefore the interpretation of the results might be biased. As a consequence, this econometric model was only used as an instrument for evaluating and validating the results of the study.

Further research studies should be carried out in this area, particularly to assess the specificities of each country and the different effects that terrorism has. The nature and characteristics of terrorism across countries might have different impacts on tourism.

8. BIBLIOGRAPHY

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9. APPENDIX

9.1. DIAGNOSIS TESTS APPLIED TO THE ESTIMATED MODELS

1. *Poolability Test*

The first test applied (F-test) is used with the aim of verifying if we are in presence of pooled effects or fixed effects. In the null hypothesis, the homogeneity is assumed in the constant (pooled hypothesis) and in the alternative hypothesis the constant heterogeneity (fixed effects).

H_0: $\alpha_1 = \alpha_2 = \cdots = \alpha_6 = 0$

H_1: $\exists\, \alpha_j \neq 0,\ j = 1,..,6$

The F statistic used to test this hypothesis is as follows:

$$F_{stat} = \frac{\frac{R^2_{fe} - R^2_{pool}}{N-1}}{\frac{1-R^2_{fe}}{(NT-N-K)}} \sim F_{(N-1,NT-N-1)}$$

Where R^2_{fe} is the coefficient of determination of model estimation with fixed effects. R^2_{pool} is the coefficient of determination of model estimation with constant common, N the number of countries, T the time periods and K the number of explanatory variables. Thus, fixed effects are considered if $F_{stat} > F_{(N-1,NT-N-1)}$.

2. *Breush-Pagan Test*

The second test applied (Lagrange Multiplier test) is used with the aim of verifying if we are in the presence of pooled effects or random effects. In the null hypothesis, the homogeneity is pooled and in the alternative hypothesis is the constant random effects.

H_0: $\sigma^2_\mu = 0$

H_1: $\sigma^2_\mu \neq 0$

The Breush-Pagan test is an LM test given by the following relationship:

$$LM = \frac{NT}{2(T-1)}\left[\frac{\sum_{i=1}^{N}(\sum_{t=1}^{T} w_{it})^2}{\sum_{i=1}^{N}\sum_{t=1}^{T} w_{it}^2}\right]^2 \sim x_1^2$$

Where N represents the number of countries, T the time periods. Thus, the random effects are considered if LM > X_1^2.

3. *Hausman Test*

The third test applied (Hausman test) is used to decide which is the most appropriate model when comparing random effects and fixed effects. Under the null hypothesis, the random effects model estimators (GLS estimation) are consistent and efficient. On the other hand, under the alternative hypothesis, the random effects (and OLS) GLS estimators are not consistent, but the fixed effects estimators are consistent.

H_0: $\text{Cov}(\eta, X_{it}) = 0$

H_1: $\text{Cov}(\eta, X_{it}) \neq 0$

The *Hausman* statistic used to test these hypotheses is as follows:

$$H = (\hat{b}_{fe} - \hat{b}_{re})[Var(\hat{b}_{fe}) - Var(\hat{b}_{re})]^{-1}(\hat{b}_{fe} - \hat{b}_{re}) \sim X_K^2$$

Where,

b_{fe} is the vector of the fixed effect model estimators;

b_{re} is the vector of the random effects model estimators;

Var(b_{fe})is the variance-covariance matrix of the estimators;

Var(b_{re})is the variance-covariance matrix of the estimators;

K is the number of regressors;

If $H > X_k^2$ the model with random effects is rejected. Consequently, the model with fixed effects is the most appropriate.

After these diagnostic tests have been applied, it will be possible to determine which model is most appropriate, taking into account the data set being analyzed.

9.2. RESULTS OF THE DIAGNOSIS TESTS

9.2.1. Terrorism effect's estimation on the aggrieved country's tourism demand

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*23,46*	*< 3,2 * e^{-16}*	*38*	*44*
Breush-Pagan Test	*135,85*	< 2,2 * e^{-16}	1	2
Hausman Test	*310,348*	9,22 * e^{-006}	5	

9.2.2. Estimation of Islamic State and Al-Qaeda attacks effects on the aggrieved country

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*21,78*	*< 7,2 * e^{-18}*	*38*	*44*
Breush-Pagan Test	*129,61*	< 3,1 * e^{-17}	1	2
Hausman Test	*300,32*	< 8,74 * e^{-16}	5	

9.2.3. Estimation of internal radical groups attacks effects on the aggrieved country

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*17,96*	*< 5,7 * e^{-16}*	*38*	*44*
Breush-Pagan Test	*119,54*	< 2,4 * e^{-16}	1	2
Hausman Test	*264,184*	9,22 * e^{-006}	5	

9.2.4. Terrorism effect's estimation on the competing countries' tourism demand

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*17,891*	< 4,2 * e^{-16}	38	44
Breush-Pagan Test	*189,74*	< 1,2 * e^{-16}	1	2
Hausman Test	*284,971*	4,85 * e^{-006}	5	

9.2.5. Estimation of Islam-oriented attacks effects on the competing countries

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*24,31*	*< 3,6 * e^{-12}*	*38*	*44*
Breush-Pagan Test	*137,58*	< 2,6 * e^{-12}	1	2
Hausman Test	*363,47*	< 9,74 * e^{-12}	5	

9.2.6. Estimation of internal radical groups attacks effects on the competing countries

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*17,08*	*< 5,2 * e^{-52}*	*38*	*44*
Breush-Pagan Test	*96,12*	< 6,9 * e^{-20}	1	2
Hausman Test	*421,04*	< 4,7 * e^{-30}	5	

9.2.7. Regional terrorism effect's estimation on the competing countries

9.2.7.1. East Asia & Oceania

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*14,63*	*< 7,9 * e^{-01}*	*38*	*44*
Breush-Pagan Test	*165,85*	< 1,4 * e^{-09}	1	2
Hausman Test	*210,16*	< 6,6 * e^{-12}	5	

9.2.7.2. America

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*20,37*	*< 4,1 * e^{-23}*	*38*	*44*
Breush-Pagan Test	*131,49*	< 5,3 * e^{-13}	1	2
Hausman Test	*305,47*	< 2,9 * e^{-19}	5	

9.2.7.3. North of Europe

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*27,68*	*1,3 * e^{-005}*	*38*	*44*
Breush-Pagan Test	*125,91*	< 9,1 * e^{-15}	1	2
Hausman Test	*311,25*	3,42 * e^{-006}	5	

9.2.7.4. South of Europe

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*26,14*	*< 6,2 * e^{-11}*	*38*	*44*
Breush-Pagan Test	*129,62*	< 6,4 * e^{-15}	1	2
Hausman Test	*299,36*	< 3,41 * e^{-06}	5	

9.2.7.5. Middle East & North of Africa

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*29,21*	*< 7,8 * e^{-11}*	*38*	*44*
Breush-Pagan Test	*145,96*	< 3,1 * e^{-23}	1	2
Hausman Test	*287,74*	< 10,22 * e^{-12}	5	

9.2.8. Terrorism effect's estimation on the safest competing countries

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*36,96*	*< 9,2 * e^{-16}*	*38*	*44*
Breush-Pagan Test	*101,62*	< 1,4 * e^{-11}	1	2
Hausman Test	*370,45*	< 4,4 * e^{-11}	5	

9.2.9. Terrorism effect's estimation on the neighboring countries

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*49,86*	*< 2,2 * e^{-18}*	*38*	*44*
Breush-Pagan Test	*126,63*	< 3,5 * e^{-12}	1	2
Hausman Test	*325,74*	< 3,4 * e^{-11}	5	

9.2.10. Terrorism effect's estimation on the competing countries with similar tourist product

Test	*Statistic Value*	*P-value*	*DF 1*	*DF 2*
Poolability Test	*26,74*	*< 6,6 * e^{-17}*	*38*	*44*
Breush-Pagan Test	*96,74*	< 3,7 * e^{-16}	1	2
Hausman Test	*406,95*	< 1,8 * e^{-12}	5	

9.3. ESTIMATED MODELS

9.3.1. Regional terrorism effect's estimation on the competing countries

9.3.1.1. East Asia & Oceania

	h=0	*h=1*	*h=2*	*h=3*	*h=4*	*h=5*
Model with control variables	0.247527 ***	0.076456 *	0.160582 ***	0.030175	-0.19187 ***	-0.11348 ***
p-value	0.0018	0.0913	0.0026	0.4201	0.0000	0.0000
Number of events included	26	25	25	22	21	21
Number of observations included	828	764	721	668	630	630

Notes: These estimations are based on the Equation (2). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 1995-2017. The shock variable is the effective attacks in the competing countries, which are located in East Asia & Oceania. The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in *P-value*. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.

9.3.1.2. America

	h=0	*h=1*	*h=2*	*h=3*	*h=4*	*h=5*
Model with control variables	0.012641 *	0.017193 *	0.065093 **	0.054964 *	0.008226	0.050447 ***
p-value	0.0965	0.0639	0.0120	0.0620	0.3796	0.0020
Number of events included	19	19	18	17	17	14
Number of observations included	828	828	772	732	732	645

Notes: These estimations are based on the Equation (2). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 1995-2017. The shock variable is the effective attacks in the competing countries of the targeted destinations which are located in America region. The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in *P-value*. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.

9.3.1.3. North of Europe

	h=0	*h=1*	*h=2*	*h=3*	*h=4*	*h=5*
Model with control variables	-0.03529 *	-0.01005 *	0.00223 **	-0.00025	0.009151 *	0.012034 **
p-value	0.0573	0.0766	0.4771	0.1984	0.0629	0.0414
Number of events included	88	88	83	71	63	57
Number of observations included	828	786	731	674	641	601

Notes: These estimations are based on the Equation (2). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 1995-2017. The shock variable is the effective attacks in the competing countries of the targeted destinations which are located in North of Europe. The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in *P-value*. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.

9.3.1.4. South of Europe

	h=0	***h=1***	***h=2***	***h=3***	***h=4***	***h=5***
Model with control variables	0.000451	0.019269 **	0.015947 *	-0.01786 *	-0.00274	-0.01238 *
p-value	0.2298	0.0487	0.0545	0.0904	0.4471	0.0958
Number of events included	117	101	96	96	82	71
Number of observations included	828	768	719	671	643	599

Notes: These estimations are based on the Equation (2). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 1995-2017. The shock variable is the effective attacks in the competing countries of the targeted destinations which are located in South of Europe. The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in *P-value*. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.

9.3.1.5. Middle East & North of Africa

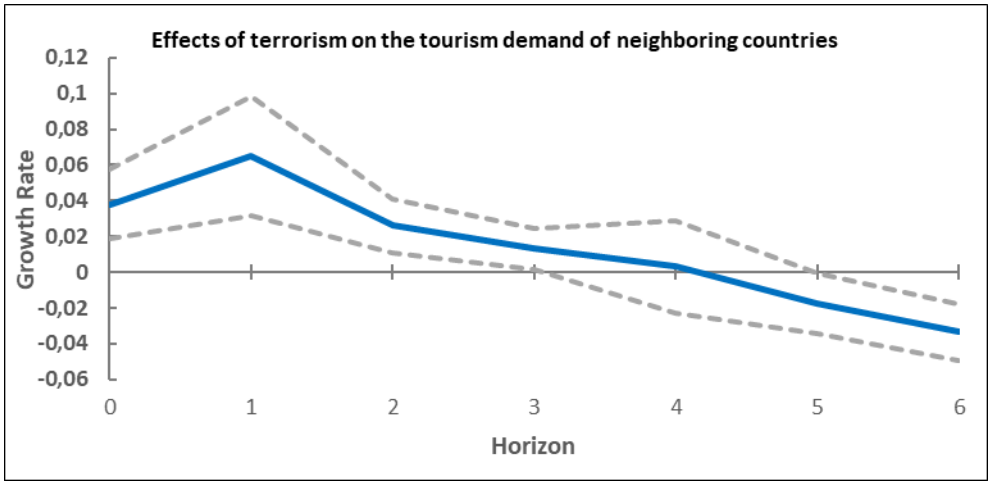
	h=0	***h=1***	***h=2***	***h=3***	***h=4***	***h=5***
Model with control variables	0.0695533 **	0.10434 *	0.0770287 ***	0.0589741 **	0.056448 *	0.086631 ***
p-value	0.0200	0.0812	0.0099	0.0255	0.0766	0.0000
Number of events included	31	30	30	25	23	18
Number of observations included	828	780	780	702	624	561

Notes: These estimations are based on the Equation (2). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 1995-2017. The shock variable is the effective attacks in the competing countries of the targeted destinations which are located in Middle East & North of Africa. The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in *P-value*. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.

9.3.2. Scenario 1: Terrorism effect's estimation on the neighboring countries

	h=0	*h=1*	*h=2*	*h=3*	*h=4*	*h=5*	*h=6*
Model with control variables	0,0378 **	0,0651 **	0,0261 ***	0,0131 **	0,00311	-0,0178 *	-0,0335 *
p-value	0,0351	0,0325	0,0012	0,0260	0,3569	0,0715	0,0680
Number of events included	253	253	233	210	210	208	204
Number of observations included	828	828	796	745	745	740	732

Notes: These estimations are based on the Equation (2). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 1995-2017. The shock variable is the effective attacks in the neighboring countries of the targeted destinations. The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in *P-value*. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.

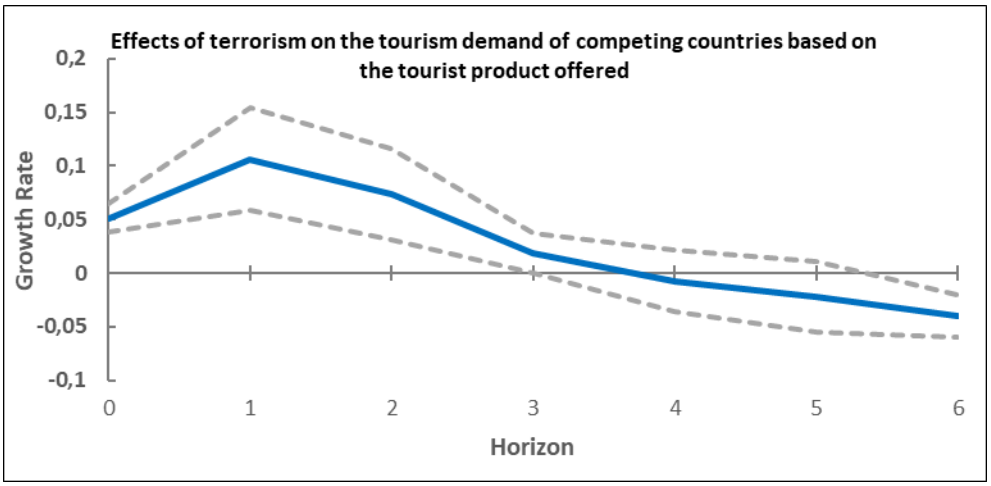


9.3.3. Scenario 2: Terrorism effect's estimation on the competing countries with similar tourist product

	h=0	*h=1*	*h=2*	*h=3*	*h=4*	*h=5*	*h=6*
Model with control variables	0,0513 ***	0,1061 *	0,0734 *	0,0186 **	-0,00711	-0,0217	-0,0396 **
p-value	0,0030	0,0862	0,0678	0,0341	0,1567	0,2471	0,0486
Number of events included	241	239	239	220	220	203	197
Number of observations included	828	803	802	800	763	701	701

Notes: These estimations are based on the Equation (2). The dependent variable is the growth rate of tourism demand, calculated using the control variables described previously for 1995-2017. The shock variable is the effective attacks in the

competing countries of the targeted destinations based on the tourist product offered. The number of countries included in the estimations is 36. Robust-clustered standard errors are presented in *P-value*. *, **, *** denote significance levels of 10, 5 and 1 percent respectively.



10. ANNEXES

10.1. TOP 9 SAFEST COUNTRIES IN THE WORLD BETWEEN 2008 AND 2017

Rank	2008	T	2009	T	2010	T	2011	T	2012	T	2013	T	2014	T	2015	T	2016	T	2017	T
1	Iceland	1,11	Iceland	1,16	Iceland	1,14	Iceland	1,10	Iceland	1,16	Iceland	1,16	Iceland	1,16	Iceland	1,14	Iceland	1,14	Iceland	1,08
2	New Zealand	1,26	New Zealand	1,26	New Zealand	1,25	New Zealand	1,26	Denmark	1,24	Denmark	1,20	Denmark	1,18	Denmark	1,18	Denmark	1,20	New Zealand	1,22
3	Denmark	1,27	Denmark	1,27	Japan	1,33	Denmark	1,29	New Zealand	1,28	New Zealand	1,29	New Zealand	1,27	New Zealand	1,26	New Zealand	1,24	Portugal	1,27
4	Japan	1,33	Japan	1,33	Denmark	1,33	Japan	1,33	Japan	1,35	Austria	1,31	Austria	1,29	Austria	1,26	Austria	1,25	Austria	1,29
5	Austria	1,34	Austria	1,37	Austria	1,38	Switzerland	1,38	Finland	1,39	Japan	1,31	Canada	1,33	Japan	1,32	Portugal	1,32	Denmark	1,30
6	Norway	1,37	Sweden	1,38	Slovenia	1,39	Slovenia	1,39	Czechia	1,40	Canada	1,34	Japan	1,33	Canada	1,34	Canada	1,34	Canada	1,33
7	Ireland	1,37	Norway	1,39	Sweden	1,39	Sweden	1,41	Austria	1,41	Czechia	1,38	Sweden	1,38	Australia	1,37	Czechia	1,37	Singapore	1,40
8	Australia	1,37	Slovenia	1,39	Australia	1,39	Finland	1,41	Sweden	1,41	Finland	1,39	Czechia	1,38	Czechia	1,37	Switzerland	1,37	Slovenia	1,37
9	Canada	1,37	Australia	1,39	Norway	1,41	Austria	1,42	Ireland	1,43	Sweden	1,40	Finland	1,38	Sweden	1,38	Japan	1,37	Japan	1,38

Notes: Column *T* indicates the score of the Global Peace Index associated with each country, according to Global Peace Index

10.2. TERRORIST ATTACKS SORTED BY COUNTRY

Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Australia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1
Austria	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Belgium	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Canada	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Chile	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Czech Republic	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0
Denmark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
Estonia	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
France	1	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	2	1	1
Germany	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	1
Greece	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0
Hungary	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Israel	0	1	1	0	0	0	1	1	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0
Italy	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Japan	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Korea Republic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Latvia	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mexico	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0
Netherlands	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
New Zealand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Poland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Portugal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovakia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spain	1	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1
Sweden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Switzerland	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tunisia	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Turkey	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	1	0	1	1	0
United Kingdom	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	1	1	1
United States of America	0	1	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1

Notes: Terrorist attacks sorted by country between 1995 and 2017